

Rock Products

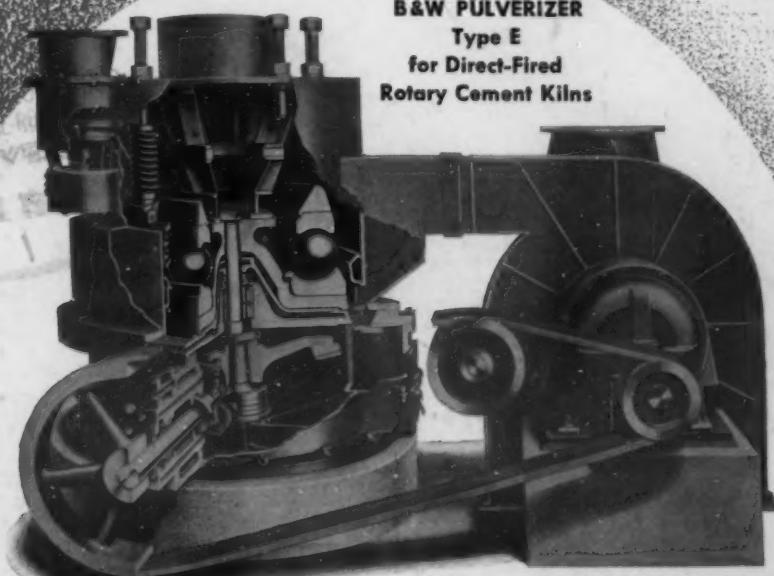
THE INDUSTRY'S RECOGNIZED AUTHORITY

DECEMBER 1941

More than
100,000 BARRELS
per day is the combined capacity of cement
kilns using B&W Direct-Firing Pulverizers



B&W PULVERIZER
Type E
for Direct-Fired
Rotary Cement Kilns



The vast experience in design, manufacture and installation of direct-firing pulverizers, that made possible this substantial capacity, is available to cement plants in which continuous operation is a vital factor today.

THE BABCOCK & WILCOX COMPANY
85 LIBERTY ST., NEW YORK, N.Y.

BABCOCK
&
WILCOX

Modern Aggregate Plants

...by

TELSMITH

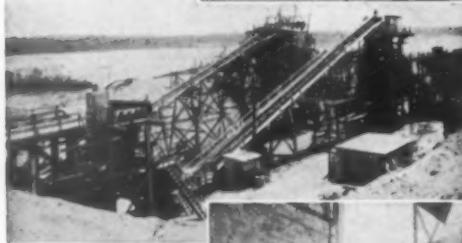
Like hundreds of Telsmith plants all over the world, these new rock crushing and gravel washing plants have operated smoothly, efficiently and profitably right from the start. Most of them are operating on defense work, where the production pressure is tremendous. A Telsmith plant means the latest in equipment—crushers to bin gates—Telsmith-designed-and-built for extra staying power, greater flexibility and capacity, lower operating and upkeep costs. And Telsmith *Balanced Engineering Service* and centralized responsibility fits that plant to your own particular needs. Write for Bulletin EP-11.



Pendleton Const. Corp.
Dublin, Va.



Crystal Concrete
Products Co.
Braintree, Mass.



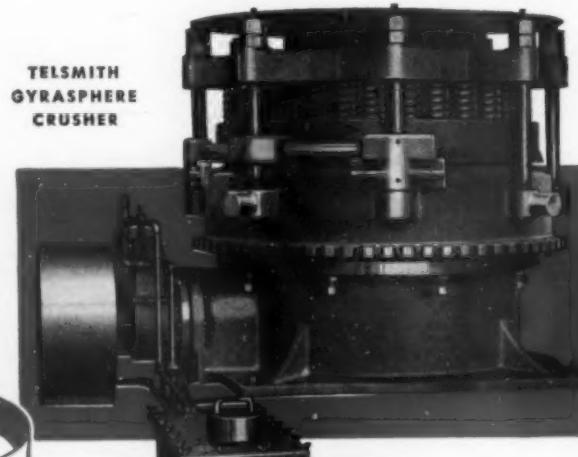
Callan Construction Co.
Wickford Junction, R. I.

Richmond Sand &
Gravel Co.
Richmond, Va.



Boston Sand & Gravel Co.
East Greenwich, R. I.

Banks Stone & Sand Co.
Wilkes-Barre, Pa.



TELSMITH
GYRASPHERE
CRUSHER



Arundel Corporation
Woodbury Quarry
Baltimore, Md.

Rosoff Sand & Gravel Corp.
Kerhonkson, N. Y.



SMITH ENGINEERING WORKS, 508 E. CAPITOL DRIVE, MILWAUKEE, WISCONSIN

Cable Addresses: Sengworks, Milwaukee—Concrete, London

MP-2

Room 1604—50 East 42nd St. 211 W. Wacker Drive 713 Commercial Trust Bldg. 19-21 Charles St. Vern Wheeler Eqpt. Co. Brandeis M. & S. Co.
New York City Chicago, Ill. Philadelphia, Pa. Cambridge, Mass. Columbus, Ohio Louisville, Ky.

G. F. Seecy & Co.
Toronto, Ont.

Charleston Tractor & Eqpt. Corp.

Roanoke Trac. & Eqpt. Co.

North Carolina Eqpt. Co.

Wilson-Weesner-Wilkinson Co.

Charleston, W. Va.

Roanoke, Va.

Raleigh and Stateville, N. C.

Knoxville and Nashville, Tenn.

"—but why use my picture?"

asks COTT FARRELL, V. P.



"WHY use my picture, Rich? Why don't you show something we make — industrial cars, electric trucks or trailers for instance?"

Rich: "We want our friends and customers to read this advertisement. They know our products. I would like them to get the human side of our work. This ad is you in person, telling what is being done to expedite their orders — explaining how we can help them in other ways."

Cott: "Nothing new there. Our customers and our suppliers all face the same problems in this emergency. They all have their expediting departments. Our sales engineers are acting as liaison men between our suppliers and our purchasing department. They're cutting red tape, following up on our orders, working to get shipments through on materials. But everybody is doing the same thing."

Rich: "Extra work helps all-round."

Cott: "All industrial salesmen are taking on extra work these days. Since early this year our men have been scouting for idle shop facilities within a thirty-mile radius of our plant. At present we have thirteen shops adding to our capacity. It takes time to

train them to our way of doing things but we are getting results."

Rich: "—and making deliveries."

Cott: "Of course our increase in production capacity is due mostly to increased facilities in our own shop. Improvements like that new welding equipment you saw this morning, and the new runway those men are working on now. That will speed up receiving and shipping. But our biggest worry is getting materials fast enough to keep all our men at work. Many of our friends are faced with the same difficulty."

Rich: "How can we help them?"

Cott: "One thing we probably do more of than most companies is engineering counsel. That's because of the nature of our business. We don't sell many standardized products. Most of our sales are to meet highly specialized requirements, jobs that call for the contact of top-flight handling experts. Our men have been trained that way, and now, with more time for survey work, they have been able to help our friends in many ways. They're helping to get faster, better service with old equipment. In one typical case our man helped a manufacturer to rebuild a lift-truck in the customer's own shop to smash a serious bottleneck. That kind

of counsel is always free to our friends. You might say that we are doing more counsel and less selling."

Rich: "We're taking new orders."

Cott: "And we're not holding back on new ideas. Our engineering department is on its toes, developing and testing new ideas every day, and putting them into production as soon as they are ready. And our sales engineers are like a field laboratory. They maintain an active interest throughout the life of every unit they sell. That's where many of our most important improvements are started."

Rich: "There's extra value."

Cott: "Even so, we're keeping prices as close to the bone as possible. But there's nothing new in what I've told you. It's just what we have been doing for the last twenty-five years—and what we hope to keep on doing. Only today it's more counsel and less selling."



J. C. (Cott) Farrell, V.-Pres., and F. A. (Rich) Richardson, Adv. Mgr.

Rich: "That is what we have been calling 'Counsel for Defense' in ads with pictures of our other sales engineers. May I use your picture, Cott?"

Cott: "You're the advertising manager. You decide. Well, so long, Rich. See you Tuesday."

* * *

COUNSEL for DEFENSE

When an Easton Sales Engineer calls on you why not invite him to look over your material handling and storage facilities. Perhaps he can give you ideas for immediate speed-ups and short-cuts. For information write to Engineering Counsel, Easton Car & Construction Co., Easton, Pa.



EASTON-ENGINEERED MATERIAL HANDLING EQUIPMENT
INDUSTRIAL CARS AND TRAILERS FOR EVERY PURPOSE
ELECTRIC TRUCKS • SEMI-TRAILERS • TRUCK BODIES, ETC.

EASTON

Rock Products

Recognized the World Over as the Leader in Its Field

With which has been consolidated the Journals *Cement and Engineering News* (founded 1896) and *Concrete Products* (established 1918)

VOL. 44, No. 12, DECEMBER, 1941

Contents of This Issue

Not Easily Regimented	<i>Nathan C. Rockwood</i> 29
Direct Firing With Tube Mills	<i>Bro Norgberg</i> 34
Automatic controls on kilns and tube mills regulate flow of coal and burning conditions	38
Gravel for "Porous" Concrete	<i>Bro Norgberg</i> 34
Becker County Sand and Gravel Co. meets unusual specifications for power project	38
Six Diesels Operate Stone Plant	<i>Bro Norgberg</i> 34
Lambert Bros., Inc., furnishes aggregates for big aluminum plant with Diesel-operated units	38
Crush Million Tons of Stone for T.V.A.	<i>Bro Norgberg</i> 34
Birmingham Slag Co. enlarges plant capacity from 80 to 400 tons per hour for dam project	43
Stone Sand for Cherokee Dam	<i>Bro Norgberg</i> 46
Crush and screen stone without application of water; use hydraulic classifier for fines	46
Same Quarry—Different Rocks	<i>H. B. Willman</i> 49
Resistance of the Chicago Area dolomites to freezing and thawing	49
Revolutionary Type of Lime Kiln	<i>T. R. Ellerbeck and W. E. Heffernan</i> 53
Relatively small calcining units burn limestone down to $\frac{1}{4}$ -in.	53
Determining the Surface Area by Air Permeability Method	<i>S. L. Meyers</i> 56
No Waste Motion in Block Plant	<i>Cinder Products Corp.</i> provides ideal working conditions for employees
Cinder Products Corp. provides ideal working conditions for employees	63
Birmingham Likes Lime Putty	<i>Bro Norgberg</i> 63
New plant of Standard Building Material Co. supplies 75 per cent of all lime mortar	65
Army Witnesses Test of Concrete Pipe	<i>Bro Norgberg</i> 65
Proportioning Concrete Materials by Unit Layer Method	<i>J. C. Witt</i> 75
Critical Defense Minerals	<i>Nathan C. Rockwood</i> 77

Departments

Staff Letter	25	News of the Month	78
Editorial	29	New Machinery	80
News About People	30	Traffic News	94
Hints and Helps	32	Obituaries	98
Concrete Products	61	Index of Advertisers	106

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ROCK PRODUCTS Bears the Twin Hall-Marks of Known Value.



★



Impartial measurement of reader interest in terms of paid circulation.

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ROCK PRODUCTS

IN EVERY DIRECTION THAT COUNTS★

Caterpillar
Diesel

YOU'RE
dollars ahead
WITH "CATERPILLAR"
DIESEL POWER

(A) GRAVEL PLANT. Near Southland, Texas, the "Caterpillar" Diesel D13000 Engine at left drives the Pioneer plant below for the Guitaque Sand & Gravel Co. Operates 12 hours a day, using about 4 gals. of fuel per hour.

(B) COMPRESSOR. This "Caterpillar" Diesel D13000 Engine drives an Ingersoll Rand air compressor for the Burkesville (Va.) Stone Corp. Operates 10 hrs. a day on quarry work, using about 4 gals. of low-cost fuel per hour.

(C) SHOVEL. A "Caterpillar" Diesel D13000 Engine powers this Koehring 1½-yard shovel handling rock for the Pickens Quarries near Plattsmouth, Neb. Working 8 hrs. a day, engine consumes about 4 gals. of 7½% fuel per hour.

*** QUALITY.** With "Caterpillar" Diesels running your equipment, you're ahead from the start—through the outstanding value your dollars buy in the high-grade materials, proved design and precision manufacture with which these world-famous power units are constructed.

*** DURABILITY.** You're dollars ahead through the stamina and durability that have been built into these engines. "Hi-Electro" hardening of crankshaft journals and cylinder liners gives these vital parts far greater wear-resistance than is possible by any other practical method of heat treatment. Specially designed oil and fuel filters, dual cooling, and sure-acting seals against dirt and grit are other life-prolonging features.

*** SIMPLICITY.** You're dollars ahead from the fact that "Caterpillar" Diesels are so simple in design that they require no frequent or delicate adjustments, no

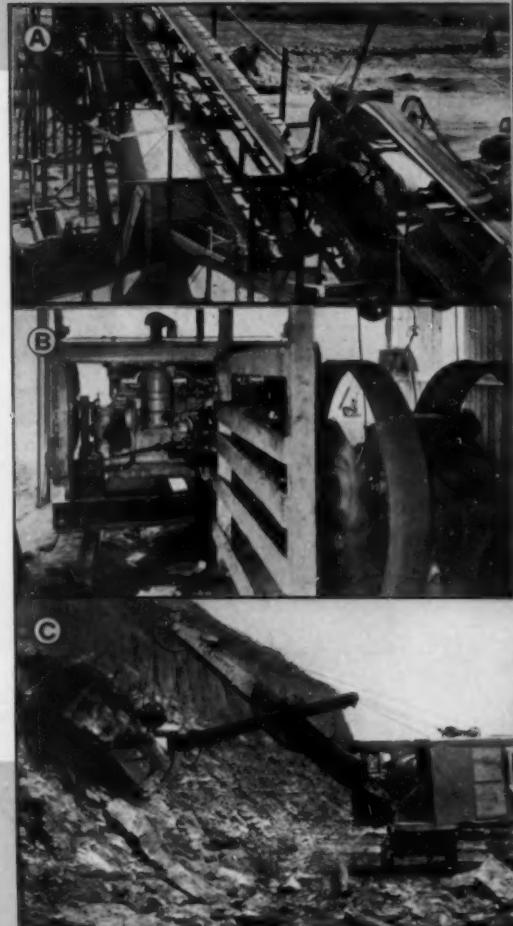
costly maintenance, no constant watching or specially trained attendant.

*** ECONOMY.** You're dollars ahead—every day, week and month—through "Caterpillar" Diesels' unusually low operating costs. Their fuel system, of "Caterpillar" design, burns even such extra-cheap fuel as No. 3 domestic burner oil; burns it completely and so efficiently that the hourly fuel cost, even of the largest models, is usually figured in dimes and cents.

*** SERVICE.** You're dollars ahead in having at your command the most complete and readily available replacement-parts and mechanical service behind any engines in the world... a service which helps you keep your "Caterpillar" Diesels fit for many thousands of hours of low-cost operation.

CATERPILLAR TRACTOR CO.
PEORIA ILLINOIS

IMPORTANT TO DEFENSE — "Caterpillar" Diesel equipment is widely active—speeding the production of rock, gravel, sand and other raw materials essential to defense.



CATERPILLAR DIESEL

ENGINES AND ELECTRIC SETS • TRACK-TYPE TRACTORS • ROAD MACHINERY

ROTARY KILNS



UNAX KILNS
FOR
LIME BURNING



UNAX KILNS
FOR
CEMENT



SINTERING KILNS
FOR ORES, PHOSPHATES, ETC.

F. L. SMIDTH & CO.

60 EAST 42ND STREET

ENGINEERS

NEW YORK, N. Y.

NEARLY SIX YEARS ON A Crusher

... and coming up for more!

WE don't have to tell you that a crusher drive is tough. So when a 36" machine was installed by a West Coast sand and gravel company, they wanted belting that could stand the gaff.

As usual, conditions were not ideal. There was a high starting load, along with an alternate wet and dry condition—all of which figure to give any belt a beating. Upon recommendation of the G.T.M.—Goodyear Technical Man—the company installed a pivoted motor base equipped with a truly endless Goodyear COMPASS "40."

COMPASS—T. M. The Goodyear Tire & Rubber Company

That was nearly six years ago. Since that time the belt has not required a moment's attention for repair or maintenance. There has been practically no stretch. And today it is still giving A-1 service.

If you'd like that kind of service on your belt-killing drives, the G.T.M. is the man to see. To bring him, write Goodyear, Akron, Ohio, or Los Angeles, California—or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

THE GREATEST NAME IN RUBBER
GOOD *YEAR*

AS A DOCTOR'S CHECK-UP PROTECTS YOUR HEALTH



... a check-up on equipment will prolong the life of wire rope

JUST as a doctor's examination will tell you what to do to bring your physical efficiency up to par, a periodical check-up of your equipment will help you get more satisfactory service from the wire rope you use.

Wire rope is designed and manufactured with great care, and an equal amount of care should be taken during installation and usage in order to secure its full service life. Check your equipment and eliminate the

undesirable conditions that result in inefficiencies and unnecessary wear.

Here are a few things to remember:

1. Handle wire rope with care, since distortion of its structure will be reflected in lowered wire rope life.
2. Check alignment of rollers, sheaves and drums.
3. Gauge the sheave and drum grooves to determine whether they have been worn undersize.
4. Turn out corrugated grooves if any occur.

5. Test sheaves and rollers to make sure they are rotating freely.

6. Replace or remachine parts that are likely to result in unnecessary wire rope wear.

When you have a wire rope problem call in an American Tiger Brand Wire Rope Engineer.



AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York



COLUMBIA STEEL COMPANY

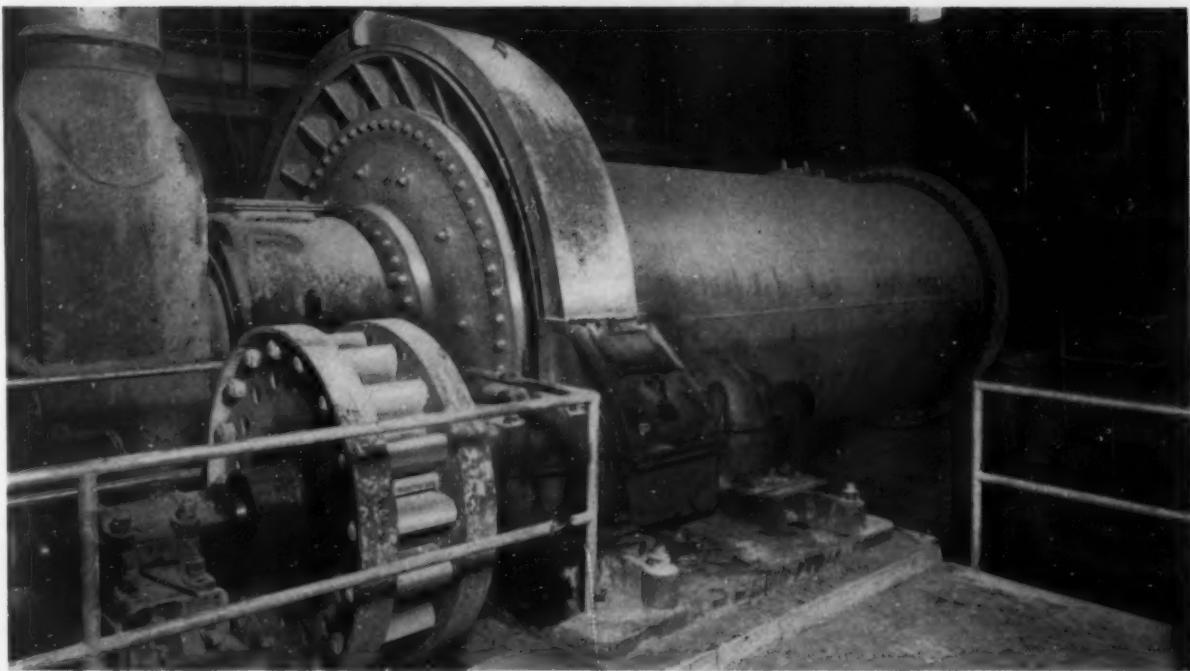
San Francisco

United States Steel Export Company, New York

Excellay Preformed

UNITED STATES STEEL

TRAYLOR GRINDING MILLS



WE BUILD

Rotary Kilns
Rotary Coolers
Rotary Dryers
Rotary Slakers
Scrubbers
Evaporators
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
Grinding Mills
Ball Mills
Rod Mills
Tube Mills
Pug Mills
Wash Mills
Feeders
Rotary Screens
Elevators

Traylor Ball Mills, Tube Mills and Compartment Mills have been used in hundreds by many of the world's greatest cement manufacturers for more than twenty years, in sizes from 5'0" dia. x 18'-0" and 9'-0" dia. x 8'-0" (shown) to monster machines 8'-0" dia. x 50'-0".

Such a record does not just happen, but was fairly earned by Traylor, because the principal business of our engineers is to keep themselves fully posted on developments in the cement industry so

as to meet its needs. Indeed, it is customary for us to anticipate those needs, and be ready with solutions before the cement manufacturers' problems are propounded.

That is why these Traylor "machines of tomorrow, yesterday" have been and are so popular with the cement engineers. That is why all cement manufacturers should use Traylor Grinding Mills, which deliver the highest quantity and quality at the lowest possible unit costs.

WRITE FOR DETAILS

T R A Y L O R
ENGINEERING & MANUFACTURING CO.
MAIN OFFICE AND WORKS — ALLENTOWN, PENNA., U.S.A.

NEW YORK CITY
3416 Empire State Bldg.

B. C. EQUIPMENT CO., LTD.
551 Howe St., Vancouver, B. C.

Export Department—104 Pearl St., New York City. Foreign Sales Agencies: London, Lima, São Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaíso, Antofagasta, Oruro, San Juan, P. R.

CHICAGO
2051 One La Salle St. Bldg.

MANILA MACH. & SUPPLY CO., INC.

SALT LAKE CITY
101 West Second South St.

Manila and Baguio, P. I.

LOS ANGELES
919 Chester Williams Bldg.

MAQUINARIA INTERNACIONAL, S. R. L.
Av. Francisco I. Madero No. 17, Desp. 214, Mexico, D. F.

SEATTLE
6311-22d, Ave. N.E.

6311-22d, Ave. N.E.

*Where
history was
made before*

LOW COST TYPE "R" NEW RECORDS

FAIRFAX STONE

The Fairfax Stone, marking the Potomac's headwaters, was the western limit of Lord Fairfax's vast estate. The line of 1736 was checked by a survey, 1746, on which was engaged Peter Jefferson, father of Thomas Jefferson.

Because the No. 322 Allis-Chalmers Type "R" Crusher can produce large tonnage of minus $\frac{3}{8}$ " product, both the Type "R" and the roll crusher operate only three hours a day... a big saving in power consumption and man hours for the operators of Fairfax Sand & Crushed Stone.



Let ALLIS-CHALMERS COOPERATIVE

CRUSHER SETS FOR PRODUCTION EFFICIENCY!

Fairfax Sand & Crushed Stone Co., Thomas, W. Va., Increases Capacity 50% . . . Slashes Operating Costs! Here's a Typical Example of How Allis-Chalmers Cooperative Engineering Works.

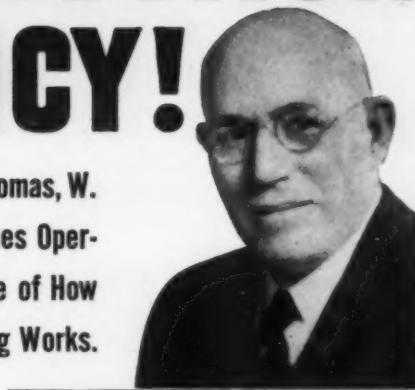
On the site of historic Fairfax Stone, the Honorable Abraham Lincoln Helmick, dean of the West Virginia Senate, is making profits in a crushed stone plant that operated at a loss for many years before.

Chief products are railroad engine sand and concrete sand, which formerly were made by passing sandstone directly from a 6" gyratory crusher to a roll crusher. But over-size pieces quickly grooved to roll faces . . . caused over-size material to pass through the rolls and over the scalping screen as waste for which there was no market.

Then Senator Helmick took over, called in Allis-Chalmers engineers to cooperate with him on a modernization program.

Increases Capacity 50%

By installing a new No. 322 Type "R" Crusher ahead of the roll crusher, they not only eliminated the high percentage of waste and saved the cost of grinding the crushing rolls periodically . . . but capacity was increased 50% . . . operating time of the roll crusher cut from eight to three hours a day! In 1940 Fairfax Sand



A member of the West Virginia Senate for 24 years, the Honorable Abraham Lincoln Helmick is an able business man as well . . . proved by the profit statement of Fairfax Sand & Crushed Stone Co.

& Crushed Stone showed a profit for the first time in many years!

That's why Senator Helmick recently gave Allis-Chalmers the order for three modern vibrating screens and a double screw sand washer to replace outmoded equipment—made his plant 100% Allis-Chalmers-equipped!

And that's why, when a production problem comes up in your plant, you'll find it pays to call on Allis-Chalmers. Working with your own engineers, we bring the tremendous inter-related experience of the world's largest manufacturer of rock and ore reduction machinery to bear on your individual problems.

This is our cooperative engineering service. Why not let us show you how it can help you save production dollars? Write Allis-Chalmers, Milwaukee, Wisconsin. A1398

*News of
other Allis-Chalmers
Products that cut
your costs.*



SMOOTHER OPERATION...INCREASED efficiency . . . reduced power and maintenance costs—that's what you get with the New Allis-Chalmers Rip-Flo Screen with uniform circle throw.



THE NEW, LARGER SIZE NO. 636 TYPE "R" Crusher allows more operators to take advantage of the big savings of "Speed-Set" Control. A turn of the hand crank gives instant change of product size.



"I'M TOUGH ON MOTORS!" THAT'S what E. H. Humberstone, Superintendent Marble Cliffs Quarries Co., Columbus, Ohio says. That's why he uses Allis-Chalmers Lo-Maintenance Motors—187 of them like the 10 hp motor shown here on which not one cent has been spent for repairs in 15 years.

ENGINEERING *Cut your costs*

Clean, Safe, Silent Conveying . . .



THE FULLER-KINYON SYSTEM

The fewer moving parts that make up any piece of equipment, the more continuous service at the lowest operating cost. The Fuller-Kinyon Conveying System is an outstanding example of simplicity of design . . . one moving part . . . the screw in the pump.

This screw is so constructed that it will withstand exceedingly severe service and, after long, gruelling operation, if repairs become necessary, the machine is so designed that the screw can easily be removed and replacement made in a very short time.

The conveying lines consist of standard steel pipe . . . no mechanical parts such as links, buckets, screws or drags. Nothing moves but the material and air.

Photograph above, taken during construction, shows an installation of Portland cement silos. Two main conveying lines carry the cement from the finishing mills to storage silos and bins. Distribution is made from the main lines to 52 delivery points. Compare this clean-cut, simple layout of pipe lines with a mechanical system to make the same distribution and delivery.

When you install a Fuller-Kinyon System you install a permanent system, one that will last a lifetime with the least possible repairs.

FULLER COMPANY CATASAUQUA, PENNSYLVANIA

Chicago: 1144 Marquette Bldg.
San Francisco: 320-321 Chancery Bldg.

P-50

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS . . . ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS . . . AIR-QUENCHING COOLERS . . . BIN SIGNALS

All LORAIN SHOVELS QUALIFY FOR QUARRY SERVICE

IN DESIGN . . . Pick any unit at random from the $\frac{3}{8}$ to $2\frac{1}{2}$ -yd. Lorain line and you've got a quarry shovel. Every one is built to Center Drive design for direct-to-the-point power application; maximum working capacities per pound of weight; and simplified construction using fewer and stronger parts. Add heavy-duty, welded steel shovel boom and stick, rugged crawler, and a host of time and maintenance-saving features and you have every qualification for a well-rounded rock shovel.



AND PERFORMANCE . . . Illustrated here are 3 of the 4 Lorain shovels purchased by Nally & Mudd for quarry service. The two units in the upper right are $\frac{3}{4}$ -yd. Diesel Lorain-40A's and have moved 385,000 tons to date from this Kentucky quarry. Both work 16 hours a day, produce an average of 2000 tons each daily. The unit at lower left is a new $1\frac{1}{4}$ -yd. Diesel Lorain-70. It works 10 hours daily, moves about 30,000 yds. per month, mostly stripping overburden.

*Write today for catalogs describing
these $\frac{3}{8}$ to $2\frac{1}{2}$ -yd. quarry shovels*

**THE THEW SHOVEL COMPANY
LORAIN, OHIO**



**$\frac{3}{8}$ to $2\frac{1}{2}$ -YD.
LORAINS**



HERE'S a way to put your plant in better shape for increased output in 1942—with *present* machines and equipment: Call in a Gulf engineer and let him work with your plant men to improve lubrication practice. For the proper application of the right lubricants is a vital requirement for maximum production — it helps to insure full capacity performance from machines — and freedom from breakdowns and mechanical troubles.

You can depend upon Gulf Engineering recommendations—they are based upon thorough technical knowledge

and broad practical experience in the field—and they are backed by a large and competent research organization with the most modern research facilities, which constantly adds fresh knowledge of lubricants and their application to Gulf's vast fund of information—gained through 38 years active experience.

Begin now to get the many benefits of Gulf Engineering Service, which is quickly available in 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.



GULF OIL CORPORATION • GULF REFINING COMPANY

Gulf Building • Pittsburgh, Pa.



Typical Bowl Mill installation with panel board. Over 700 units sold in past six years for direct firing boilers, cement and lime kilns and industrial furnaces—30% on repeat orders.



SINCE 1887

**WRITE FOR
CATALOG #43**

The urgent need for "all-out" production makes it imperative for operators of cement, lime and similar plants to adopt this **dependable** method of direct firing rotary kilns.

The Bowl Mill is capable of continuous operation, month after month, 24 hours a day, without shutdowns . . . all adjustments being made while the machine is running.

Notice the panel board, shown above, which gives a constant operating picture of pressures throughout the system, the power required, rate of feed and temperature. The admission of hot air for drying is automatically controlled.

Handles any grade of coal . . . maintains a uniform grind . . . assures noiseless, vibrationless, dustless operation . . . sets an all-time low in total coal preparation costs . . . that's the Raymond Bowl Mill.

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.

1307 North Branch Street

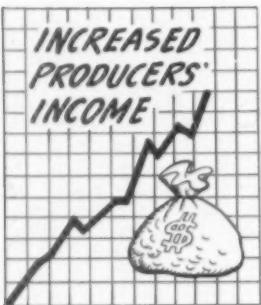
Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal

CHICAGO

First IN DEFENSE

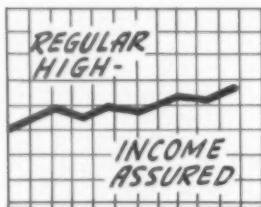
MORE EQUIPMENT IS NEEDED

ROCK PRODUCTS' JANUARY ANNUAL REVIEW ISSUE WILL SHOW



FIVE MARKETS WITH HIGH PRIORITY RATINGS!

- 40,000,000 tons of Limestone and Lime for Steel, Metallurgical and Chemical Industries.
- 12,000,000 tons of Agricultural Lime and Limestone and Dolomite and Limestone for "Filler" in fertilizer.
- Heavy tonnages of silica sand for foundries, plate glass, track sand for coal mines, railways, etc.
- A vast amount of miscellaneous rock products, such as mica, feldspar, phosphate rock, etc., for vital use in defense and food production.
- A tremendous amount of various building materials to complete the gigantic military construction program undertaken by the government in 1941. Apparently the end of the year 1941 will find only about 50% of the \$10,000,000,000 defense construction completed, and the remaining \$5,000,000,000, plus at least an additional \$2,250,000,000 to be added for 1942, calls for an unusually big tonnage of rock products materials to be produced next year.



Rock Products Materials Needed for Other Important Demands, Too

Although these defense requirements are huge in volume, they do not tell all the story for this important field, because thousands and thousands of tons of rock products will be produced for other needs too. Indications for 1942 are that plants will continue working at peak production capacities.

MANY PLANTS MUST BE IMPROVED

While 1941 only meant the beginning of the huge defense program, yet many rock products plants had to be improved to meet production demands and strict specifications. The numerous descriptions of plants erected, improved or enlarged for defense orders, which have appeared in ROCK PRODUCTS during 1941, show how it

was necessary many times to install new and improved equipment. Plants producing for defense orders get high priority ratings, A-1-a in many cases, and as there is no shortage of rock products raw materials this field represents an important key market for 1942 equipment sales.

**ROCK PRODUCTS PRODUCERS
will need much new equipment to
fill 1942 Defense orders**

ROCK PRODUCTS

The Industry's Reliable Source

309 W. JACKSON BLVD.

E

IS NEEDED IN THE ROCK PRODUCTS INDUSTRY

Show how typical plants are equipped to meet defense demands—
Now is the time to tell them about your equipment, too

Rock Products January Issue—An Operator's Manual

Each year the ROCK PRODUCTS January ANNUAL REVIEW ISSUE has always been the most outstanding and popular number of the year, both with readers and advertisers—and the January, 1942, issue will be even more valuable as it will be such an important issue to its thousands of readers. Important because it will feature "Defense," illustrating plant installations, typical of those filling defense orders and those which have been confronted with new and difficult production problems. The experience of others will be told to all our readers. With such an array of valuable and timely information producers will keep the January, 1942, issue of ROCK PRODUCTS as an Operator's Manual, more so than they have any other issue before.



ADVERTISERS GET PLUS-VALUES

Your advertisement in this outstanding number will keep your name and equipment before the men who do the buying for many months, because it will be referred to constantly. Space is offered at regular rates—special preferred positions are also available in Sepia Section—quotation on request.



BUILD FOR THE FUTURE NOW!

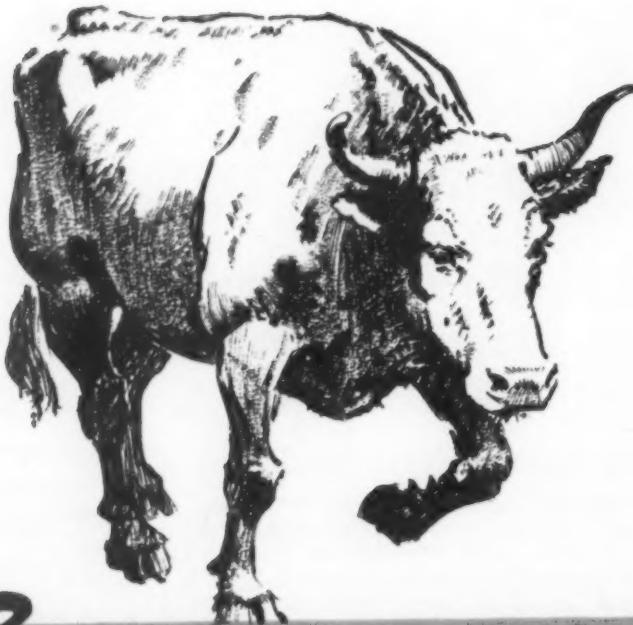
Your advertisement in ROCK PRODUCTS now will not only BE READ by those producers filling the huge defense orders, but will be building the way for future equipment sales. Already the President's National Resources Commission is considering \$25,000,000,000 for public works projects, to be started after the war or when defense requirements are ended. Now is the time to make your advertising dollars work two fold—start in ROCK PRODUCTS January, 1942, ANNUAL REVIEW ISSUE. First forms close December 22. Send your reservations now for best positions.

INCLUDE ROCK PRODUCTS in
your 1942 BUDGET—it will mean
increased equipment sales for
you now and in the future

RODUCTS

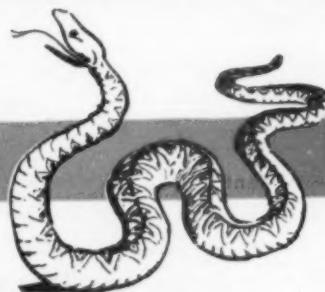
try's Recognized Authority

CHICAGO, ILLINOIS



STRONG AS AN OX. . . .

but supple too

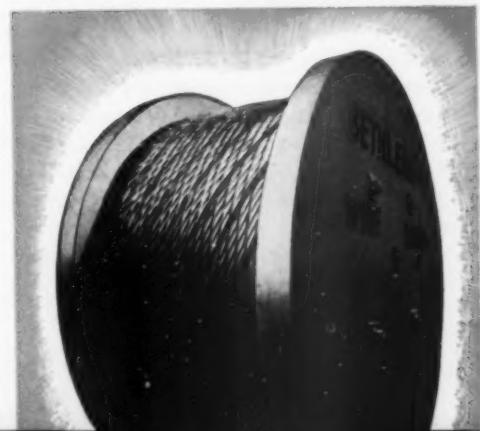


**PURPLE STRAND
FORM-SET
WIRE ROPE**

Rugged strength and smooth, easy handling get together in Purple Strand Form-set wire rope.

The Purple Strand means that the rope is 100 per cent Improved Plow Steel, the strongest, toughest steel used in making wire rope. The Form-set (pre-formed) construction means that the rope is easy to handle, won't wicker, spools smoother, is more resistant to bending fatigue.

Next time you buy wire rope for a hard-running job . . . look for the Purple Strand, and then say "Form-set." You'll be getting a combination of strength and ease of handling that's hard to beat.



BETHLEHEM STEEL COMPANY

No "Second Start" DIGGING!



FIGURE out what it costs you to make two passes through the material every time you fill the dipper.

Watch a Northwest in tough digging and you see at once why it's a Real Rock Shovel. With a Northwest, there is no stuttering "second start" digging to fill the dipper.

Northwests don't lose time by starting over! The whole story is told in "Digging Power Plus!" Ask for it!



It's
**REAL
ROCK
SHOVEL**

—and when you have
a Real Rock Shovel
you won't have to
worry about output
in any digging!

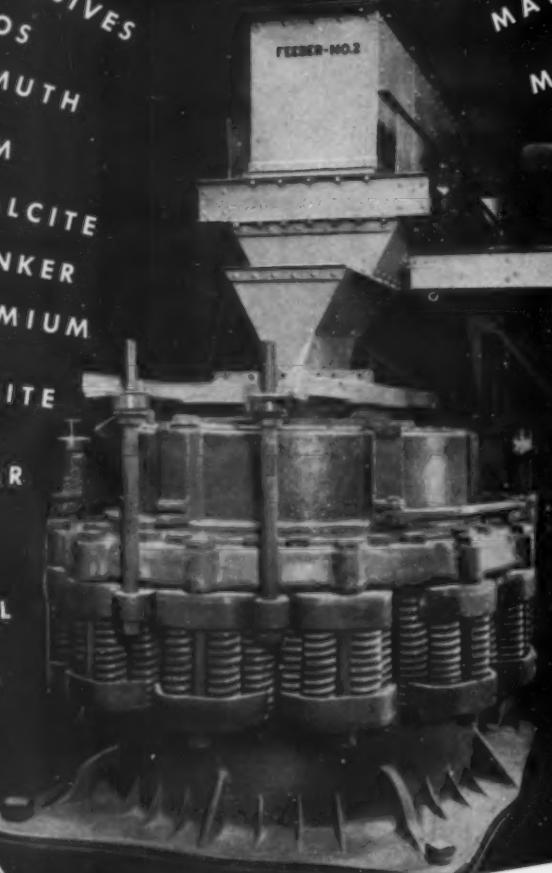
NORTHWEST ENGINEERING COMPANY
1820 Steger Blvd. • 28 E. Jackson Blvd. • Chicago, Ill.

NORTHWEST

Built in a Range of 18 Sizes, 3/8 Cu. Yd. Capacity and Larger

SYMONS CONE CRUSHERS

Used for Fine Reduction Crushing of
MANY ORES AND INDUSTRIAL
MINERALS



A circular arrangement of mineral names surrounds the central crusher image:

- ABRASIVES
- ASBESTOS
- BRICK
- BISMUTH
- CADMIUM
- CARBIDE
- CEMENT CLINKER
- COPPER
- CHROMIUM
- DOLOMITE
- FELDSPAR
- FLUORSPAR
- GANISTER
- GRANITE
- GRAVEL
- GOLD
- IRIDIUM
- IRON LEAD
- LIMESTONE
- MAGNESITE
- MANGANESE
- MATTE MERCURY
- MOLYBDENUM
- NITRATE NICKEL
- PALLADIUM
- PLATINUM
- PYRITE
- QUARTZITE
- RADIUM
- RHODIUM
- ROCK ASPHALT
- SANDSTONE
- SHALE
- SILICA
- SILVER
- SLAG SINTER
- TIN
- TRAPROCK
- TUNGSTEN
- URANIUM
- VANADIUM
- WOLFRAMITE
- ZINC

Perhaps you have a fine crushing problem of one of these or similar materials. If so, investigate the merits of the Symons Cone in attaining a more desirable product, in greater capacity and at lower cost.



NORDBERG MFG. CO.

NEW YORK · LOS ANGELES · LONDON · TORONTO

MILWAUKEE
WISCONSIN



VULCAN kilns were chosen because of their rigid construction, reliable operation, and up-to-date design, incorporating the latest VULCAN features of welded shell, facilitating installation of brick work; patented, locked, rivetless tires, preventing revolving on the shell; self-lubricating roller bearings, reducing horsepower; and a completely enclosed drive, producing a more quiet and efficient kiln.



These views show 2 of 4 Welded Vulcan Kilns recently placed into operation by Pennsylvania-Dixie.

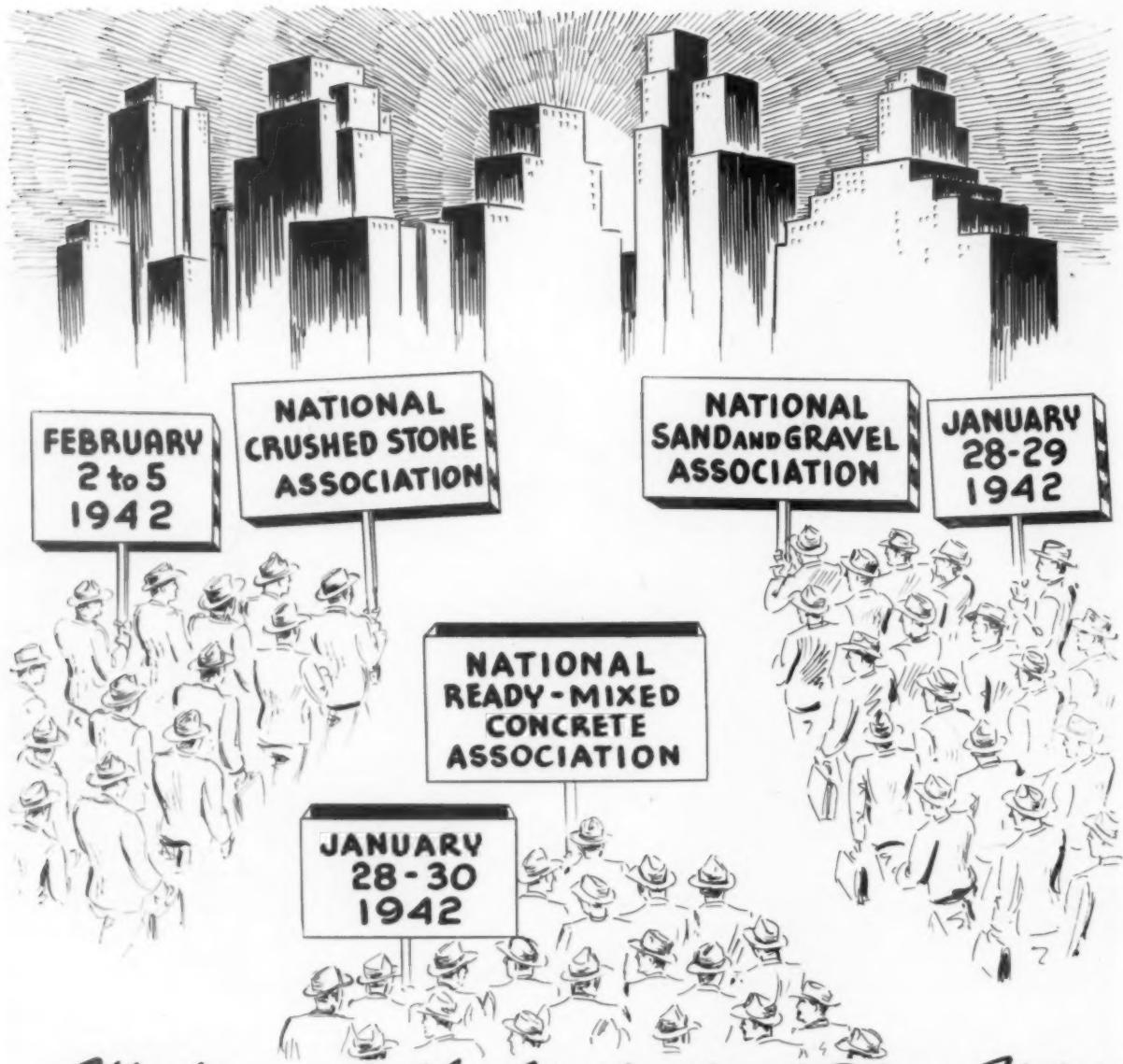
VULCAN IRON WORKS

ENGINEERS & BUILDERS

• Wilkes-Barre, Pa.

50 Church St.
New York, N. Y.

407 S. Dearborn St.
Chicago, Ill.



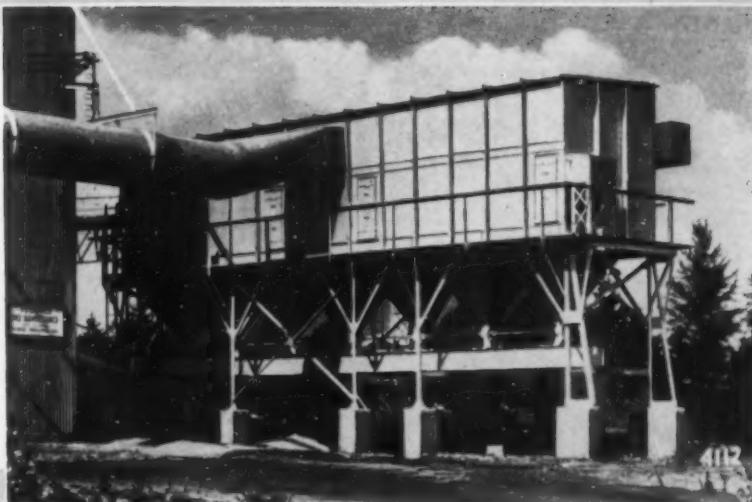
*Meet you at the Netherland Plaza Hotel
CINCINNATI, OHIO*

- Most Critical Period in American Industry
- Greatest Opportunity Ever Offered the National Industrial Associations
- Exhibit of Up-to-date Machinery and Equipment
 - Opportunity to Confer with Brother Producers
- Renew Old Friendships
 - Help Our Nation Solve Its Problems
- Help You Solve Yours

ENOUGH SAID!!!

• An Aid to Greater Production

SLY DUST CONTROL



Sly Dust Control
at the Staso Mill-
ing Co., Pembine,
Wis., producers of
granulated roof-
ing stone.

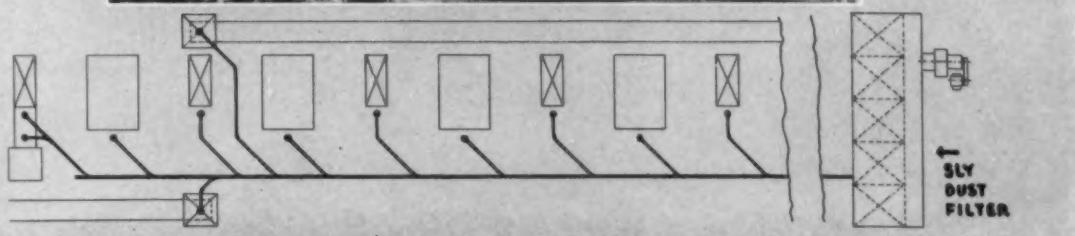


Diagram of connection of Sly Dust Filter with various sources of dust—crushers, screens, conveyors and elevators. At these points dust-laden air enters hoods and is drawn through piping to the filter—dust filtered out and easily disposed of.

In these days of high-speed production, Sly Dust Filters are of vital aid in making cleaner plants, helping maintain quality of product, saving maintenance costs, and protecting health and safety of employees.

Exclusive advantages in Sly Dust Filters:

- (1) Greater filtering capacity because of more filtering cloth.
- (2) Taut bags at all times, saving power and resulting in quicker removal of dust.
- (3) Bags more easily replaced.
- (4) Automatic control (any degree) minimizing or removing the human factor.
- (5) Simpler shaker mechanism resulting in savings in maintenance and operation.

Whatever your dust problem, write us. Sly engineers are experienced with all kinds of industrial dusts. We shall be glad to tell you what advantages you, too, can realize, and give you full particulars.

That the advantages of Sly Dust Filters—their savings in space, power, and maintenance—are widely appreciated in the Cement Industry is evident from the fact that Sly is a 4 to 1 favorite in this industry.

THE W. W. SLY MANUFACTURING CO.

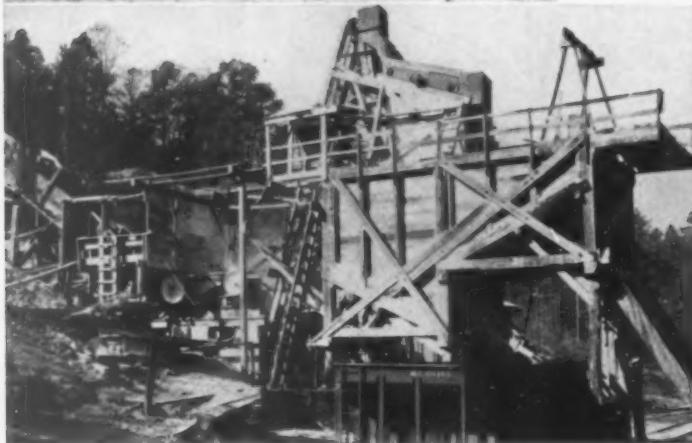
Branch Offices in Principal Cities

4746 Train Ave., Cleveland, Ohio





We've got the right
layout for your
quarry or pit!



There's a progressive, capable Universal Crusher Company Sales-Servicenter near you! Dealers in key centers throughout the hemisphere.

Universal builds jaw and roll crushers, pulverizers, conveyors, elevators, hoppers, bins—everything that goes to make up a stationary or portable rock or gravel crushing, screening and loading plant.

Tell us the conditions in your deposit and the materials you wish to produce and we will recommend the ideal plant layout that will insure you of maximum output and the greatest possible profit with a minimum of equipment.

Standard inter-related units can be readily assembled to produce a plant just suited to your conditions. And when you move to new "diggings", it's simple to install a larger crusher, an extra

conveyor or whatever is needed to convert your plant to meet new requirements. You'll always find Universal helpful in planning the new layout so that you will get the most out of it!

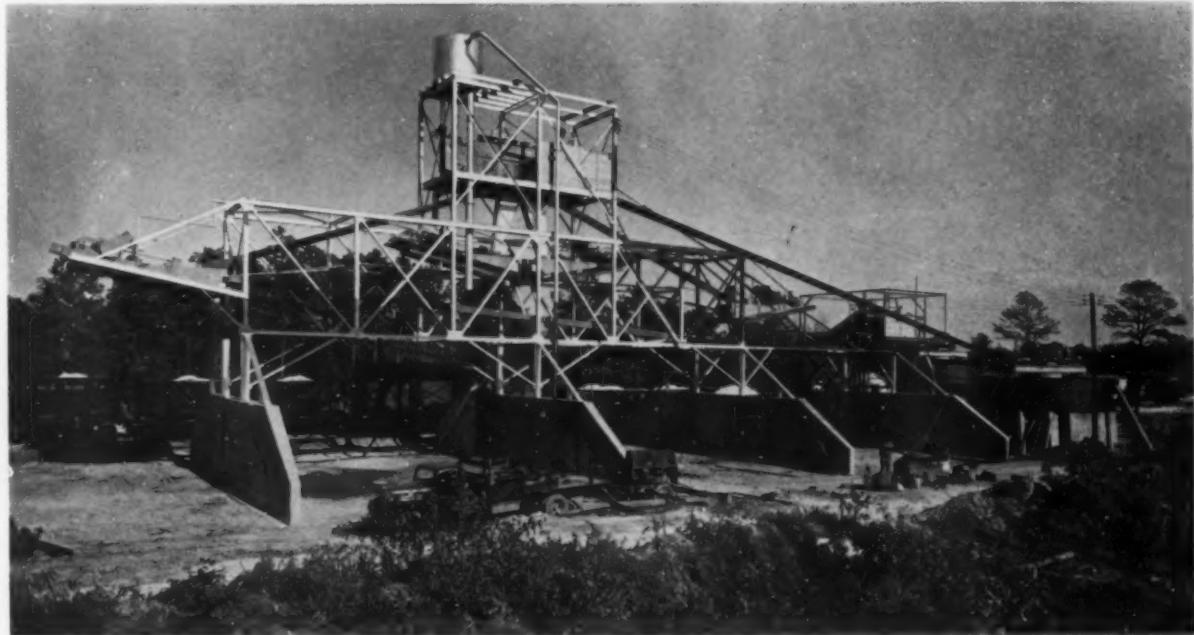
Get the full facts on the profit-proved Universal Line today!

UNIVERSAL CRUSHER COMPANY
617 C AVE. WEST CEDAR RAPIDS, IOWA

UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

High specification sand production PLUS MAXIMUM FLEXIBILITY AND PRODUCT CONTROL



Whitehead Brothers Company plant, before walls were built, showing the equipment composing the Dorr System.

FOUR STEPS IN THIS DORR SYSTEM

STEP 1
Desilting and Clay Removal in a Dorr Hydro-separator, in background.

STEP 2
Fractionation into 6 Sized Products in a Fahrenwald Sizer, on top of steel structure.

STEP 3
Washing and Grading Products Nos. 1-4 Incl. in four Dorr Classifiers, mounted on steel structure, discharging into four bins below.

STEP 4
Washing and Grading Product No. 5—Fine Core Sand in a Dorr Thickener and a Dorr Classifier in background.

● This newest Dorr Sand Preparation System of Whitehead Brothers Company at Dividing Creek, N. J., produces 40 to 50 tons an hour of high grade moulding sand. Five washed and closely sized products are made, ranging upwards in size from fine core sand.

Four steps are taken in sequence as noted at the left. Positive mechanical adjustment is provided at each unit. Result—maximum flexibility of operation—maximum control of the mesh and distribution of sizes in the five finished products.

The Dorr Sand Preparation System is equally applicable to the washing and sizing of other types of sand—concrete, asphalt, filter and special purpose sands. A sand deposit deficient in certain essential grain sizes no longer means an inability to make top specification products.

A Dorr engineer will gladly explain the Dorr System and what it will do under your own conditions.

DORRCO

THE DORR COMPANY, INC., ENGINEERS

NEW YORK, N. Y. 570 Lexington Ave.
ATLANTA, GA. Candler Building
TORONTO, ONT. 80 Richmond St. W.
CHICAGO, ILL. 221 No. La Salle St.
DENVER, COLO. COOPER BUILDING
LOS ANGELES, CAL. 811 West 7th St.

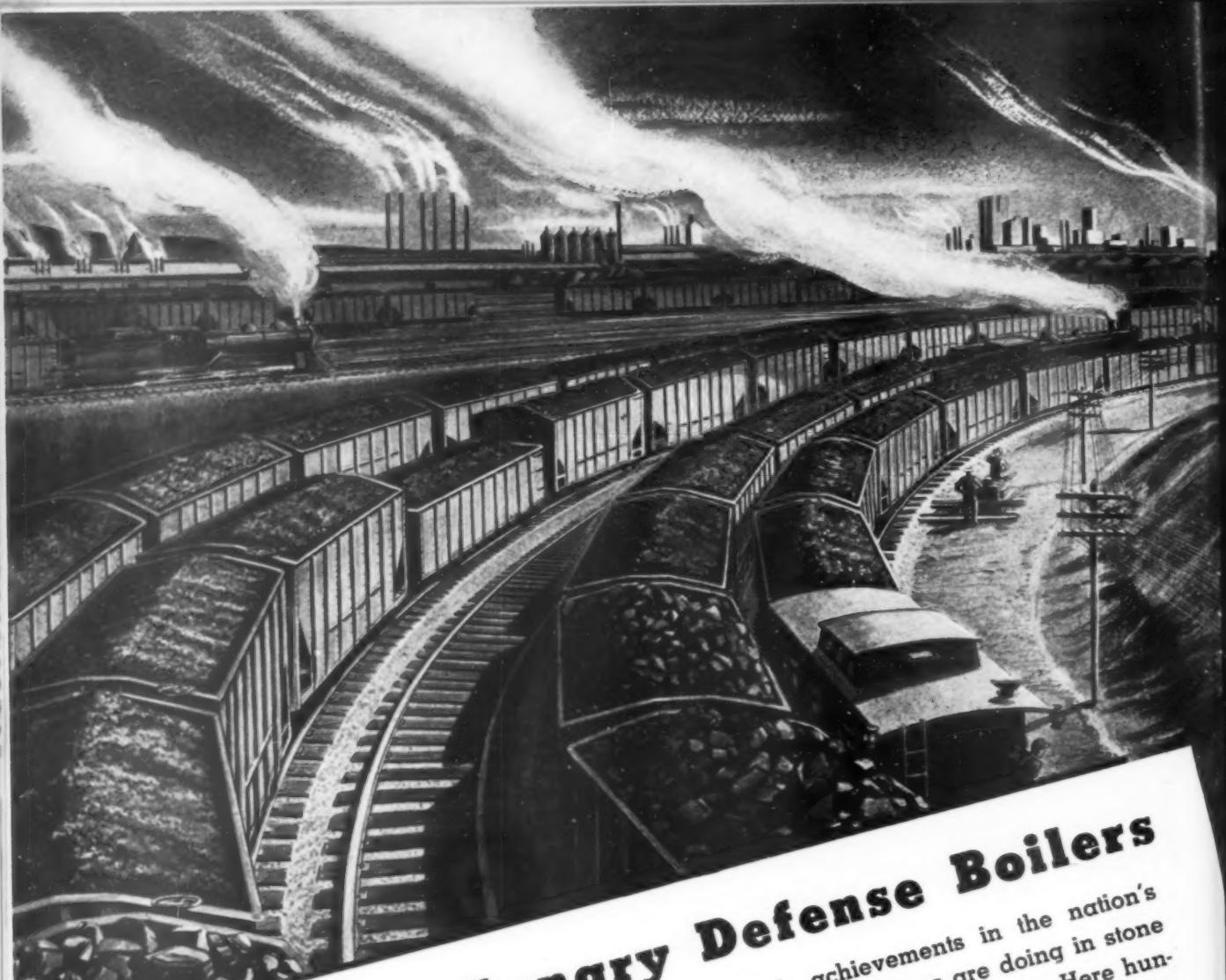
RESEARCH AND TESTING LABORATORIES
WESTPORT, CONN.

SUGAR PROCESSING
PETREE & DORR ENGINEERS, INC.
570 Lexington Ave., NEW YORK

DORR
RESEARCH ENGINEERING EQUIPMENT

ADDRESS ALL INQUIRIES TO OUR NEAREST OFFICE

DECEMBER, 1941



Food for Hungry Defense Boilers

Paralleling their achievements in the nation's coal fields is the work Marions are doing in stone quarries and in sand and gravel plants. Here hundreds of Marion shovels, draglines and clamshells are in constant operation speeding up the production of these vital raw materials for defense.

THE MARION STEAM SHOVEL CO., Marion, O., U.S.A.



MARION

SHOVELS • DRAGLINES • CLAMSHELLS • CRANES • PULL-SHOVELS • WALK-BEHIND SHOVELS
Gasoline • Diesel • Electric. $\frac{3}{4}$ cubic yard to 35 cubic yards



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Rock Products

309 WEST JACKSON BOULEVARD
CHICAGO, ILL.

December 1, 1941

Dear Subscriber:

Chicago, Ill.: In a trip through several north central states, one of our editors noticed that many ready mixed concrete plants have taken steps to continue operations throughout the winter. New boilers, in cases where they could be obtained, and reconditioned second hand boilers were being installed to heat aggregates in bins and storage piles and to provide warm water for concrete batching. Sand and gravel companies are building up large stockpiles of material and plan to operate as long as weather permits in order to have sufficient storage to meet big over-winter defense requirements. There won't be as much coal shoveling this winter among rock products plants as many new stokers and oil burners are in evidence throughout the industry. This trend may, in part, be attributed to the requirements of the federal wage-and-hour law.

Chicago, Ill.: More attention is being given to the comfort of workmen in rock products plants. Fluorescent lighting and fans are being installed, wash rooms are heated, and wash fountains and better sanitary equipment are noticeable.

San Francisco, Calif.: Union representatives recently rejected a labor contract with the Santa Cruz Portland Cement Co., containing a provision for a three-year agreement on wages. All other provisions of the contract were acceptable to the men, but they did not want to tie themselves down to an agreement for three years as the cost of living may rise rapidly in the future.

Washington, D.C.: It is expected that construction of 100 reinforced concrete barges for the transportation of oil will soon be under way. Bids have been called for their construction. While we have been wasting valuable time discussing the practicability of these vessels, England has ordered a large number of concrete barges. However, these boats are designed for river and harbor service for the transportation of goods rather than oil. They are called "ferro-concrete barges", and will carry 200 tons of cargo. Built of precast reinforced concrete slabs, the barges weigh about twice as much as a steel barge of equal capacity but require only half as much steel. A barge of precast slabs can be assembled and completed in about eight weeks. Perhaps this will open up a new field for the concrete products manufacturer?

Port Arthur, Texas: Announcement has been made that the Lower Neches Valley Authority has completed its surveys in connection with the Rockland Dam project and that bids will be called early in December. This is one of several important construction projects which are going ahead in spite of priorities and difficulties in obtaining materials. Apparently Washington has given this construction the "green light" and producers of sand and gravel, crushed stone, and cement may continue to look to this type of public works for a substantial part of their business.

Washington, D.C.: Shades of prohibition are now stalking through the land in a different form. The latest consequence of government interference with the law of supply and demand is the aluminum bootlegger. In a recent issue of the Aluminum

News Letter, the description of the "black bourse" for aluminum brings back memories of speakeasies and that sinister but glamorous chap, the bootlegger, who had a ready entry into many brass hat offices while salesmen cooled their heels on the mourner's bench. A manufacturer in urgent need of aluminum to keep the plant going calls up an unlisted telephone number and asks for Jim, who, a day or two later, has the aluminum ready. Ingots are sold at the legal rate for secondary metal but the purchaser must buy a barrel of waste paper or other junk at the same time at a price that depends on how much he wants aluminum.

Philadelphia, Penna.: Several manufacturers supplying machinery to the rock products industries have set up departments and official personnel whose entire time is devoted to the study of priority problems and the coordination of purchasing, production, and shipping activities to properly function under the present conditions. Producers also are finding it necessary to set up a similar organization, but The Warner Company, Philadelphia, Penna., is the first company to announce a regular department to handle priority problems. If the company isn't big enough to have someone devote all his time to the priority problem, it certainly would be advisable to have an official charged with this responsibility along with his other duties.

Mexico City, Mexico: That \$30,000,000 loan for highway development which was recently granted by the United States to Mexico is quite a stimulating "shot in the arm" for business in our sister republic to the South. Apparently this loan, along with other projects, has been anticipated by cement manufacturers. Word comes from Mexico that Cementos Guadalajara, S.A., whose plant is at present under construction at Guadalajara, Jalisco, Mexico, will require two 6- x 100-ft. kilns to produce special and masonry cements. It also has purchased a 7- x 135-ft. kiln for installation at the Guadalajara plant. Cementos Atoyac, S.A., producer of special and masonry cements at its plant in Puebla, Mexico, has recently purchased an 8- x 110-ft. kiln to help supply 18,000 metric tons of special low heat cement. This company also is considering construction of additional cement storage silos. Fabrica Nacional de Cemento, Novella & Cia., Guatemala City, Guatemala, Central America, has purchased a 7- x 100-ft. kiln which will double its capacity.

Chicago, Ill.: A leading portland cement manufacturer is said to have recently cooperated with our national defense program to the extent of volunteering the services of its shop facilities, without getting a taker. It is understood that over 100 letters were mailed out to concerns, most of which were known to have subcontracts, and not one took advantage of the cement company's invitation.

Chicago, Ill.: A manufacturer of quarry equipment says he is losing orders that he could fill and ordinarily would if shortages of certain materials were not taken so seriously by purchasers. It seems that if certain prospective customers did not buy the first piece of this class of equipment they found available, for fear that other manufacturers would not be able to make delivery, they might be able to get the more suitable equipment.

The Staff

2



THIS BOOK TELLS...



Where dust originates...

in the many operations of industry, such as crushing, combustion, drying, grinding, mining, powdering, roasting, sand blasting and many others.

How Buell Dust Collectors can help your business...

through the high collection efficiency of the van Tongeren System (exclusive with Buell) and the low cost of both installation and operation.



BUELL ENGINEERING CO., INC.

Suite 5000, 2 Cedar Street, New York

Nation-wide service through offices of either
Buell Engineering Co. or B. F. Sturtevant Co.

DECEMBER, 1941

What dust is...

in terms of both theory and practice in industry.

Why dust control is important...

in terms of valuable dust that may be reclaimed and reworked, and in the elimination of hazards and hindrances to production.

Who buys Buell equipment...

the great names among America's industrial leaders who have bought —and re-ordered—Buell Dust Collectors for a wide range of uses.

Your copy of "Dust In Industry" will be sent upon request, without obligation. Have your secretary ask for Bulletin R-12.



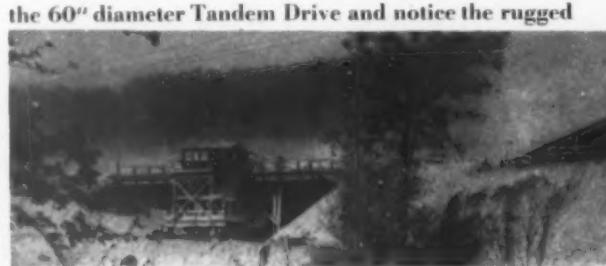
60-inch Belt Conveyor, 325 feet long Designed to carry 3500 T.P.H. up 105 feet

Building a dam to a time schedule demands equipment of the utmost reliability. That's why Geo. M. Brewster & Son, Inc., general contractors for Lackawack Dam (New York City Water Supply) chose equipment engineered and built by Robins for the task of moving 6,000,000 cubic yards of fill.

Every bit of this sizable chunk of terra firma goes up on the giant Robins conveyor shown here; a conveyor driven by two 250 HP motors through Herringbone Gear Speed Reducers. In the smaller picture look at the 60" diameter Tandem Drive and notice the rugged

structure. The Heavy Duty Roller Bearing Idlers on this Conveyor have several special-to-Robins features, such as Triple Grease Seals and "One Shot" Lubrication.

Take a tip from this and many other large and small contracts engineered and equipped by Robins, and call for a Robins Engineer.



**ROBINS CONVEYING
BELT COMPANY**

Passaic, New Jersey and Principal Cities

NOT EASILY REGIMENTED!



COMMENTING (favorably, too) on our September editorial, a correspondent laments: "Individuals don't count for anything any more." Well, individuals don't count and won't count, if they accept that point of view. If we are to count as individuals, we've got to keep our individualities; we've got to feel individually important; we've got to retain our individual self-respect—if we are to keep ourselves and all the rest of the world from being regimented.

In that same issue another reader finds the "most interesting item" we ever published, an extract from the annual report of the chairman of a big London (England) sand, gravel and ready-mixed concrete producer. This typical John Bull mentions the war and attendant inconveniences only to apologize to his share holders for not making a greater profit. What with no chance of replacing worn-out vehicles, a shortage of repair parts, loss of practically all its mechanics to army, navy and war industries, the corporation has found it rather difficult to make a good showing!

Wearing *ourselves* out wondering and fearing what is *going to happen* to our businesses, we seldom realize that with Hitler's hordes only 20-odd miles across the channel, British business, even so prosaic a business as dredging sand and gravel from the Thames River, goes on, nearly normal—we believe, because Englishmen are the most individualist of any people. Of course, we Americans pride ourselves as individualist, too, but candidly, our individualism is of a rather lawless variety, while the Englishman has remained individualist within the law. In other words, it took a boundless continent and unclaimed natural riches to develop our kind of individualism, while the average Englishman developed his from saturation with ideas of his own natural rights as an individual and as an Englishman.

Because of this stubborn English trait, some of us think that a democratic form of government may have a better chance of surviving in Great Britain than here. However, English business men are not without doubts when discussing these things among themselves, although quite obviously they are able to maintain a sense of humor, even under present conditions.

We find evidence of this in a report of proceedings at an English quarry owners' meeting, in a British contemporary. It seems that any industry, to be known and classed as "essential," must get a license to operate. The thing that irks employers most, apparently, is the absolute control this measure gives the government over labor. A speaker said: "For instance, you are not allowed to dismiss a man without the sanction of

the local Ministry of Labour and National Service. If the officer at the local Ministry grants you a permit, allowing you to dispense with that man, then either you or the man must give one week's notice. If the employee wishes to leave you, he must likewise go to the Council of the Exchange in order to obtain their permission to give you a week's notice. If there is a difference of opinion on either side, the facts have to be placed before the National Service officer, who will then come to investigate the case and, if necessary, take it before a tribunal." So, evidently, we Americans are not the only ones facing labor problems in national defense efforts.

One difficulty arises from the fact that these National Service officers are also Labor Union officials. Another speaker said the time was past when an employer could lay off a man at will; the unions would insist on a guaranteed weekly income. This was taking all discipline from the works, from the employer, and putting it in the hands of the unions. And, by golly (was the line of comment) this might be all right for some industries, but this quarry industry was different, etc.; no union-labor National Service officer should be allowed to interfere! Over here we Americans are already entering an era of fixed weekly (or monthly) incomes for labor even in the quarry industries.

There was, though, one comment that makes the incident British. Here it is verbatim: "And I fail to see what you can do in the case of men who do not come to work. We had an example of this locally. A man left suddenly—we sent the foreman to find out about it. (Incidentally, the man's dog bit the foreman; but, as the man said, it was his garden and, anyway, that was what he kept a dog for!) The man informed the foreman that he was staying away that day and the next day, and also the following Saturday as he was going to a wedding. Now, one crane standing idle makes a difference of two or three hundred tons a day. If this, gentlemen, is the national spirit that is being fostered: then we have no possible chance of winning the war."

Well, here's a condition that employers of colored labor in the deep South have always had; and they keep plants operating just the same. Those who eat must work—some.

NEWS ABOUT PEOPLE

DAVID ADAM, director of safety at the Northampton plant of Lawrence Portland Cement Co., and known as Uncle Dave to some 30,000 youngsters and their parents throughout the Lehigh Valley, in Pennsylvania, and to a host of others interested in safety, has carried on a weekly safety broadcast over Station WSAN at Allentown, Penna., since the first



David Adam

week in February of 1932. This program is on the air on Thursday evenings, from 6:45 to 7:00, and is regarded as perhaps the most powerful influence in safety education in the section covered by its broadcasts.

EDWARD P. HENRY, of the retail sales department, The Warner Co., Philadelphia, Penn., has been appointed to the newly-created position of Procurement Officer for the company. This office was created to study priority practices of the federal government, and to apply the result of these studies to the problems faced by the company in securing materials and in meeting the demands of its customers for sand and gravel, lime, crushed stone, and ready mixed concrete.

CHRIS J. SHERLOCK, Highway Director of the Alabama State Highway Department, has been named president of the American Road Builders' Association, which is the highest honor within the gift of his 30,000 colleagues engaged in the highway industry and profession in North, South and Central America and 34 countries in the eastern hemisphere who are represented by this Association. Mr. Sherlock is a native of Americus, Ga., and a graduate of Georgia Tech. He was recently elected vice-president of the American Association of State Highway officials.

HOWARD I. YOUNG, president of the American Zinc, Lead & Smelting Co., St. Louis, Mo., and head of the American Zinc Institute, has been elected president of the American Mining Congress. Mr. Young is also president of the American Limestone Co., Knoxville, Tenn.

RICHARD A. FROEHLINGER, formerly executive vice-president, has been chosen to head the Arundel Corp., internationally known heavy construction firm and producer of sand and gravel, crushed stone and ready-mixed concrete, of Baltimore, Md., replacing Joseph V. Hogan, who has been ill for some time. Joseph G. Kuhn, who was vice-president in charge of dredging, has been made executive vice-president, and Joseph N. Seifert, has been made secretary and treasurer.

H. L. WALDTHAUSEN, Jr., has left the Calaveras Cement Co., San Andreas, Calif., to superintend development work on the James Creek quicksilver property in Napa County, Calif. They are opening up an old drift to explore further a low-grade ore body which outcrops on the surface, and are retorting cinnabar concentrates obtained from the placers of James Creek.

John A. O'BRIEN and LESLIE A. BALDWIN have been elected vice-presidents of Johns-Manville Sales Corporation, a subsidiary of Johns-Manville Corporation, New York, N. Y. Mr. O'Brien will continue his duties as general sales manager of the power products and industrial department, while Mr. Baldwin will manage sales of industrial products to the chemical and paint industries, automobile manufacturers and the non-ferrous metals industry.

W. R. BURGOYNE succeeds M. G. Allison as manager of the Sweetwater, Texas plant of the United States Gypsum Company. Mr. Burgoyne was formerly manager of the Heath, Montana plant. Mr. Allison is now located at the headquarters of the company in Chicago.

SAMUEL C. HADDEN, a former commission member, has been named chairman of the Indiana State Highway Commission to replace James D. Adams, whose resignation became effective Nov. 1. Mr. Hadden has been secretary of the Indiana Mineral Aggregates Association, and is widely known among producers.

WM. WALLACE MEIN, JR., purchasing agent for the Calaveras Cement Co., San Francisco, Calif., has been promoted to vice-president and a member of the operating committee. The plant is now producing at an all-time peak for military proj-



W. Wallace Mein, Jr.

ects, such as Sacramento Airport, Mare Island Navy Yard, Benicia Arsenal, and the great Shasta and Friant dams.

PAUL D. V. MANNING, Pacific Coast editor of *Chemical & Metallurgical Engineering*, since 1926, and prominent in Western chemical engineering activities, has resigned to become director of research for the International Agricultural Corp., with headquarters in Chicago.

D. J. SHELTON, vice-president of The Marion Steam Shovel Co., Marion, Ohio, has been elected president and general manager, to succeed J. H. Watters, who has resigned but will continue to serve as a member of the Board of Directors. Alex Gibson, treasurer, succeeds Mr. Shelton as vice-president of the company. Mr. Shelton is assuming his new duties immediately, taking over the management of a company for which he has worked for 32 years. Starting in as a shop maintenance man, he advanced steadily to assistant chief engineer, a position he held for five years. He was then made chief engineer. He held this post for two years and was then advanced to vice-president of the company. As vice-president, Mr. Shelton was at first in charge of sales and engineering, a responsibility which was later extended to virtually every department of the company.

W. C. STEVENSON, widely known consulting engineer identified with the cement industry, is now located with MacDonald Engineering Co., Chicago, Ill., in charge of design in the expansion program of a cement plant near Mexico City, Mexico. He also is reporting on and analyzing a cement project in the West. This work will require his services until the first of the year. Mr. Stevenson was consulting engineer in the construction of the new Permanente Corporation cement plant in California, and was the author of a comprehensive article about the plant which appeared in *Rock Products*, December, 1940, p. 36.

V. P. AHEARN, executive secretary of the National Sand & Gravel Association, was elected vice-president of the American Trade Association Executives at their annual convention at Hershey, Penna.

L. D. DUTTON has been named manager of the San Joaquin Gravel Co., Riverbank, Calif. This plant was recently purchased by Robert Adams, owner of the Adams Sand and Gravel Co.

CLIFF SPEARMAN, superintendent of mine and quarries for the United States Gypsum Co., has been transferred from Sweetwater, Texas, to Piedmont, S. D., where he is prospecting a new area for the company.

ELMER W. PEHRSON, acting head of the Economics and Statistics Branch, Bureau of Mines, United States Department of the Interior, has been appointed chief of this branch and will continue to direct the collection, compilation, collation, interpretation and publication of statistics and data on minerals, mineral products and the mineral industries.

COL. WEBSTER R. BENHAM has been elected president of the Sulphur Silica Co., Sulphur, Okla., a company recently organized to operate a silica deposit 3½ miles south of this city for the production of glass sand in a new plant. Carroll V. Sidwell will be vice-president and general manager. J. M. Tucker, Oklahoma City, is secretary-treasurer. C. B. Adams is foreman of the initial operations. Col. Benham, the new president, is a consulting engineer for the United States government and was in charge of construction of Camp Livingston and Camp Polk in Louisiana.

S. N. KIRKLAND has been elected a director of Giant Portland Cement Co., Philadelphia, Pa. He is a member of Jenks, Kirkland & Co.

NEAL R. FOSSEEN, president of the Washington Brick & Lime Co., Spokane, Wash., is one of the many industrial and commercial leaders associated with the formation of the organization known as the Inland Empire Industrial Research, Inc., to develop the industrial resources of Spokane and the Inland Empire.

G. W. COPE has been elected president, secretary, and treasurer of the Atlantic Lime Co., Holly Hill, S. C. He has been acting as receiver for the company until the recent reorganization.

W. M. POWELL, safety director of the Medusa Portland Cement Co., Cleveland, Ohio, has been elected chairman of the Greater Cleveland Safety Council's cement and quarry section for the coming year.

FRANK J. LARKIN, traffic manager of the Woodville Lime Products Co., Toledo, Ohio, will conduct traffic management courses for first and second year students Friday evenings at the Y.M.C.A. in Toledo.

L. N. FUNDERBURG, manager of the Leeds, Alabama plant of the Universal Atlas Cement Co., is one of the members of the Rural Housing Authority of Jefferson County, Alabama, commissioned to rehabilitate farm homes, schools and communities and to establish other housing improvements.

ADVENTURES OF SUPER DAN, THE SUPERMAN



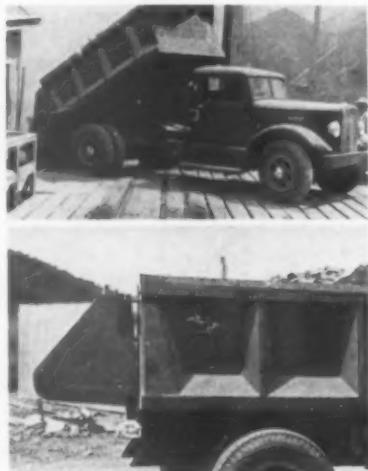
Hints and Helps

FOR SUPERINTENDENTS *

Eliminate Damage to Quarry Truck Bodies

By W. B. BOBBITT
Mgr., Radford Limestone Co., Inc.
Radford, Va.

RADFORD LIMESTONE CO., INC., Radford, Va., recently changed over its quarry haulage system from locomotive-drawn quarry cars operating over trackage to the use of trucks. This was done as it was found that by taking out 50 ft. of stone below our quarry floor we would eliminate removing a heavy overburden on top of our quarry. The locomotives, of course, could not be operated on a grade steep enough to get down into



Trucks equipped with hinged scoop type end gate with a spring to prevent backlash

the lower level which is 15 percent. It was finally decided to purchase two new 5-ton Autocar trucks with 6-cu. yd. bodies.

One serious problem was encoun-

tered when the trucks were placed in operation. It was not practicable to use an end gate which swings from the top of the body as our crusher is a 42-in. gyratory and takes a very large stone. The manufacturer of the bodies proposed to put on the Boulder Dam type scoop which has an extension of about 24 in. on a 10 to 12 deg. slope.

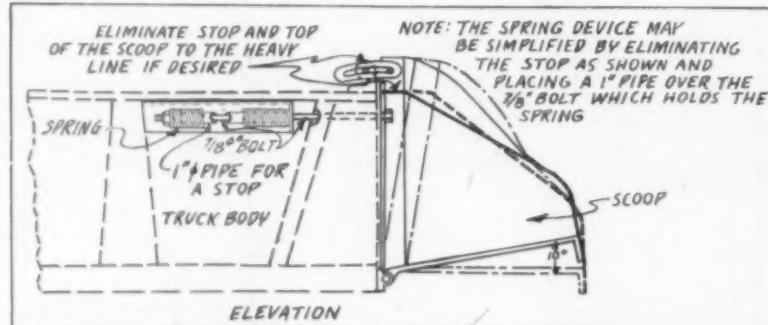
It was found in dumping that this scoop, being stationary, caused a back lash which soon began to destroy the subframe of the body. We overcame this by using a hinge scoop with a spring arrangement at the top, as shown in the drawing. This arrangement has cleared up the trouble and works perfectly in discharging the load. Steps are being taken to patent the device.

Hydro Separator Outlet

AT THE FRIANT sand and gravel plant operated by Griffith Co. and Bent Co. to supply aggregates for the Central Valley Project the sand first passes to a hydroseparator. This is in essence a cone-shaped thickener but operates at higher speed. The device allows the sand to settle and gets rid of most of the silt.

The hydroseparator discharges to two 48-in. Akins type classifiers that provide the coarser sand. Fines from this classifier overflow to two more classifiers of the same make. Fineness can be regulated by the r.p.m. of the screws, their degree of inclination and rate of flow of pulp.

To regulate the flow of pulp to the classifiers, a splitter is so arranged that the stream can be divided to the classifier in any desired proportion. A handle on the outside of the splitter



Spring application to scoop of truck body to prevent back lash on hoist



"Splitter" which controls the feed to the sand classifiers. Note lever operating on quadrant

operates on a quadrant and can be set in position as wanted.

Pipe Testing Device

TO TEST the breaking, and/or compression strengths of concrete tile does not require an elaborate rig. An hydraulic press of the simple design, usually found in most any rock products machine shop, can be made to answer. The main thing is to have



Hydraulic press used for pipe testing machine

sufficient strength in the channel irons that make up the frame; the strength depending upon what type of testing is intended.

Suitable pressure gauges can be attached to the water lines (or oil, if oil pressure is used) which will show the breaking pressures, and a simple calculation will transpose this reading into pounds per square inch.

The accompanying illustration shows the simple machine used by Jourdan Concrete Pipe Co., near Fresno, Calif. The gauges on this rig are removed to the office when the machine is not in use.

Twin Burners for Kilns

OIL IS BURNED in the Allis-Chalmers kilns at the Old Mission plant of the Pacific Portland Cement Co., Cons., San Juan Batista, Calif., using two burners instead of the conventional single burner. Air is supplied at 2 lb. pressure by a G. E. centrifugal blower. The dual burner system makes it possible to carry a much smoother flame



Two burners operated at low pressure reduce dust and noise

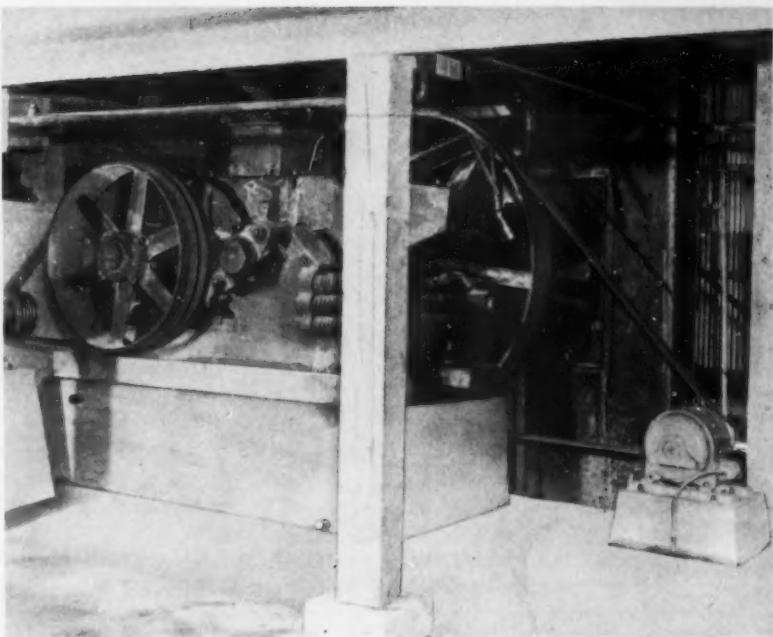
and the absence of high pressure air blast is very noticeable. This even and smooth flame also cuts down the amount of dust sent to the stacks. Clinker burned here is of small size. It is said that having the clinker in small diameters is one way to help keep the alkali content of the cement at a low figure.

Independent Motors for Rolls

By JACK F. PRUYN

A LARGE WESTERN PLANT is driving its rolls with individual motors. These rolls shown in the picture are 14- x 30-in. Allis-Chalmers. Both motors are 7½ hp., United States motors, the motor on the left being a geared motor, and the one on the right has a direct drive. The drives are through Gates V-belts.

The advantages of this arrangement can readily be seen when it is realized that there are no line-shafts, no jack-shafts, and no crossed belts.



Roll crusher with each roll driven by an independent motor through V-belts

Test on the speed of the two rolls did not even vary by one r.p.m.

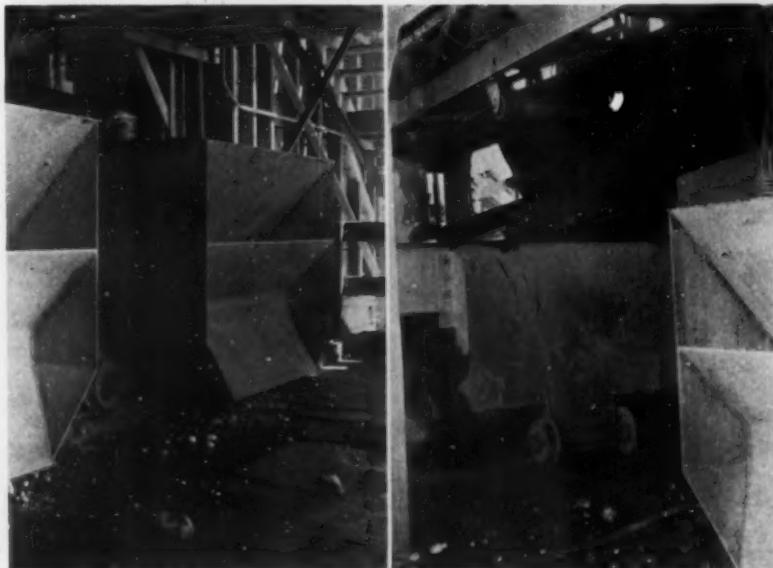
There is one flaw in this particular arrangement: The left motor, in the illustration, is too close to the rolls. This causes occasional excess wear in the gears of the motor. Longer belts would absorb much of the shock due to the usual roll-pounding, and decrease the wear on the gears.

Expedite Screen Changing

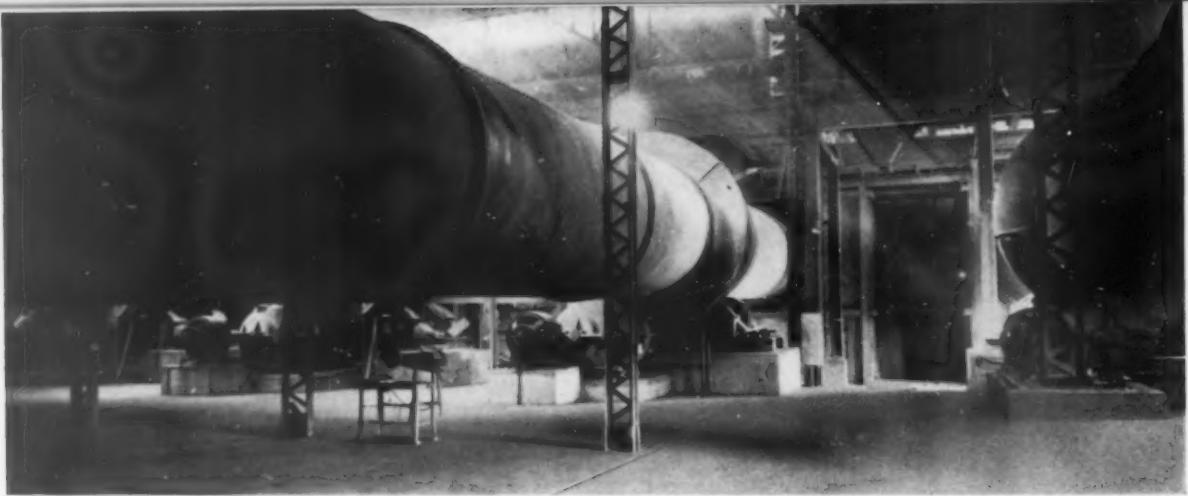
SAND AND GRAVEL is prepared in the Friant dam aggregates plant, using a battery of S-A vibrating screens.

One of the problems of changing screens on a vibrator is to so design the installation that screen frames can be withdrawn from the assembly with a minimum of trouble. Usually the lip of the chute taking the sized gravel away forms a delaying obstruction.

To overcome this handicap the designers put the chute top assembly on wheels. The wheels ride a light weight track. When it is desired to change screens the chute lip is pushed out of the way and screen changes are made quickly and easily.



Left: Movable chute top pulled out of position. Right: Rail-mounted chute top rolled into alignment with screen



Looking toward feed end of one of the new kilns, showing drive mechanism

Direct Firing With Tube Mills

Automatic controls on kilns and tube mills closely regulate flow of coal and burning conditions

NEW ROTARY KILNS went into service at the Dexter plant of the Pennsylvania-Dixie Cement Corp. at Nazareth, Penn., in 1941. The installation is all-inclusive, with new coal-handling equipment, direct-firing by unit tube mills and each of the kilns has an individual air-quenching clinker cooler. Firing is now completely instrumentalized and important variables affecting kiln burning conditions are automatic.

The Dexter (No. 4) plant is dry process, with waste heat boilers, and had been operating eight 100-ft. kilns. These kilns were not fired by individual equipment, did not have clinker coolers and lacked most of the control features now in service. Six of them

By BROR NORDBERG

were 7- x 6- x 100-ft. and the other two had 8-ft. diameters, the eight having a combined daily production of about 4000 bbl. of clinker.

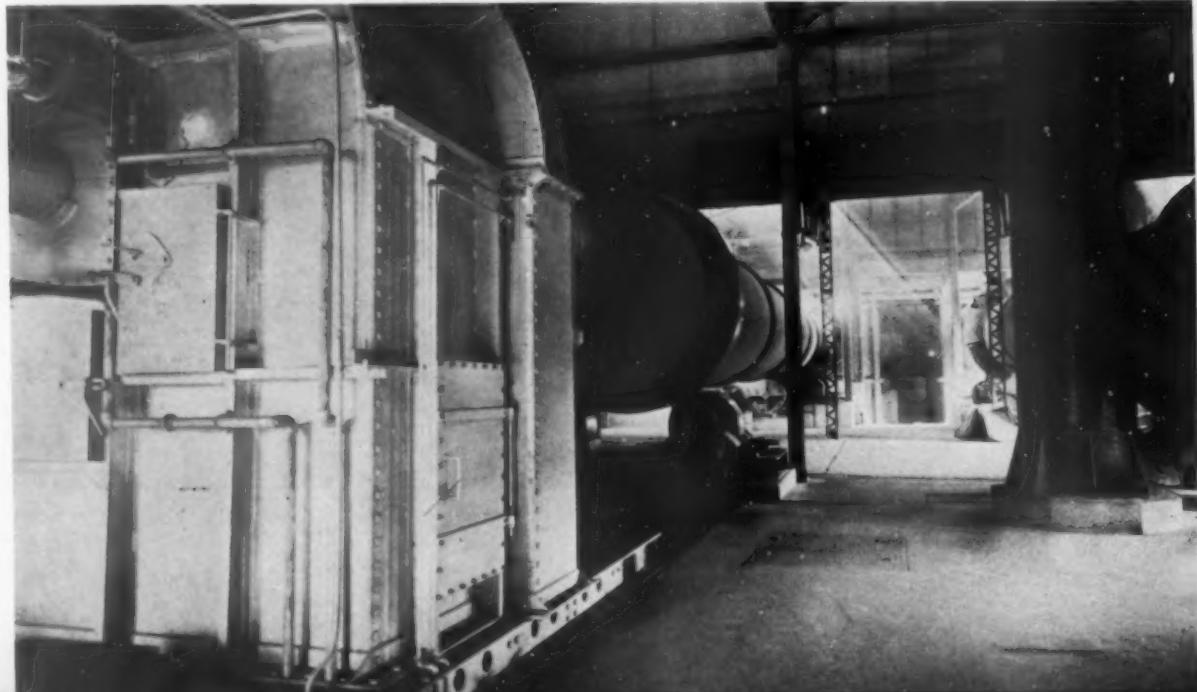
The new kilns are of all-welded construction and were manufactured by the Vulcan Iron Works. Two are 10- x 140-ft. and the other two 10- x 136-ft. Each is supported on two tires, with the standard slope of $\frac{3}{8}$ -in. to the foot, and is driven by a 30-hp. Westinghouse d. c. electric motor with a Falk gear reducer. The thrust roller is at the drive trunnion in each case. Production of each is 1300 to 1400 bbl. a day and the power con-

sumption for the drive is 20- to 25-hp. turning at an average speed of 50 r.p.h.

Each kiln is connected to one of the four waste heat boilers. Available heat for steam generation is slightly lower than it used to be because of higher kiln efficiencies, which may mean the purchase of some electric power. However, this small sacrifice in waste heat is far more than offset by a reduction in coal for burning clinker, which has dropped from 105-lb. to 76-lb. per bbl.

An important reason for the fact that a reduction of about 25 percent in the heat units needed to produce clinker affects the power generation only slightly is that the kilns are insulated for two-thirds of their length and lined for their full lengths.

Firing end of kiln having nose rings of stainless steel which are lined with high temperature, 90 per cent alumina nose block



The kilns have nose rings of stainless steel, which are lined with high temperature nose block of 60 percent alumina. This is followed by 5-ft. of length lined with either 60S HW block or GF "Wynn" block in the different kilns. Then comes 25-ft. of 70 percent alumina block, either HW or GF, followed by 18-ft. 8-in. of 60 percent HW, all 6-in. thick, and 40 percent HW block for the rest of the kiln length. Insulation consists of Johns-Manville Superex insulating block. Most of these are 3-in. thick and extend for about 90-ft. of the kiln length from the back end forward.

Feeding the Kilns

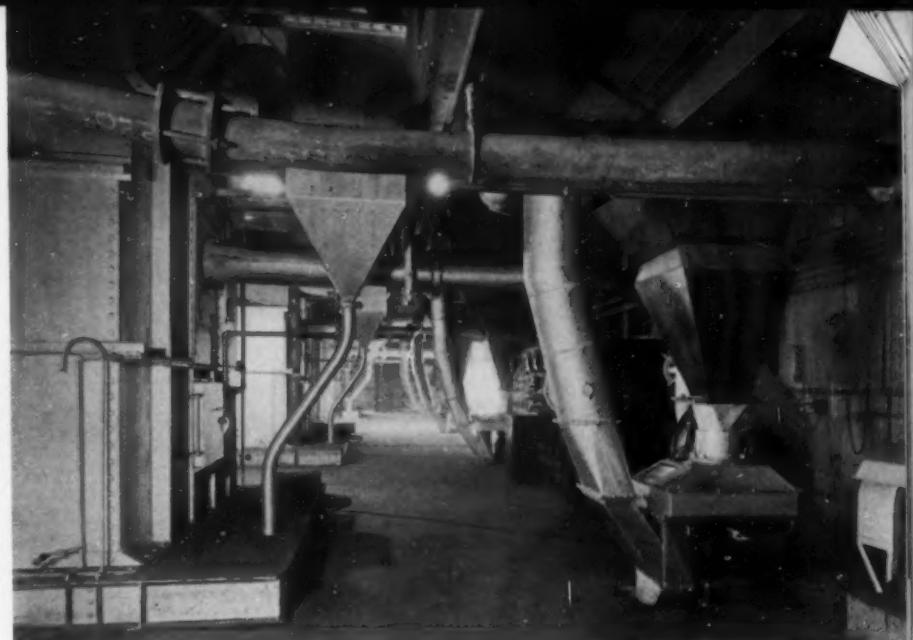
The old raw material feed bins have been retained and the method of feeding the kilns is by inclined screw conveyors. There are two 9-in. screw conveyors side by side from under each feed bin that convey the material up a 15 deg. incline, a distance of 23-ft., to discharge into the kiln feed pipe. This feeder is driven by a 10-hp. d.c. gearmotor. To hold the feed constant, small open-top surge hoppers have been built over each screw conveyor, on the theory that excesses coming to the screws due to flushing from the bin will build up inside the surge hoppers and then feed out of the hoppers by gravity back into the screws when the condition clears up. It is intended as a regulator to smoothen out the flow through the feeder.

In most dry process plants, the rate of feed is synchronized with the kiln speed through a mechanical hookup of the drives. In this plant, the d.c. motor drives on the kiln and the feeder have rheostats of identical characteristics, so hooked up at the kiln instrumental boards that adjustment of the kiln drive rheostat will automatically change that for the feeder motor proportionately.

Firing by Tube Mills

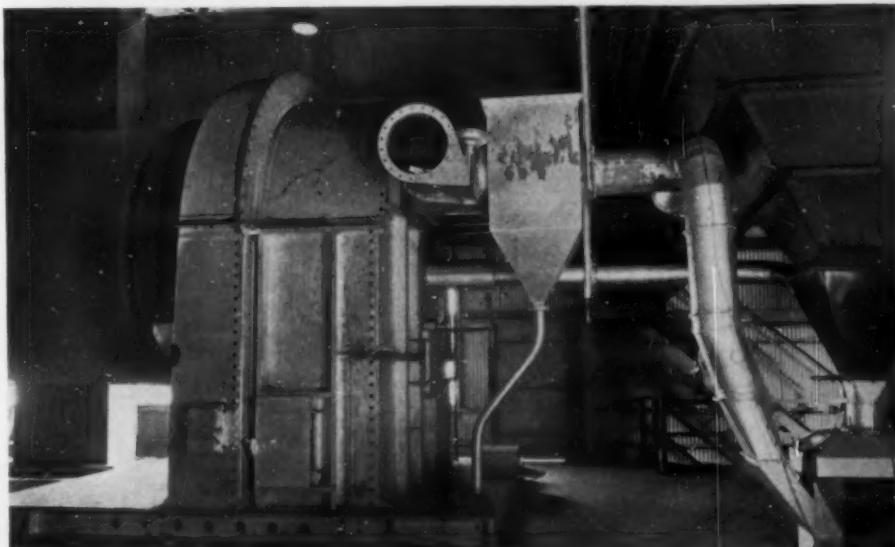
This is one of very few cement plants to operate a tube mill for direct-firing a kiln. Each kiln has an individual mill to grind the coal, dry it and inject the coal plus primary air into the kiln—all in one operation. The mills are 5- x 6-ft. Kennedy air-swept tube mills, operated under suction, and have an automatic feature to hold the coal level inside the mill to the point of optimum grinding efficiency.

Maintenance was the main consideration in selecting tube mills. Each mill has an integral drive gear and is driven from a 50-hp. motor through a flexible coupling, making a drive that is simple. The loading is 9120 lb. of forged steel balls, 20 per-

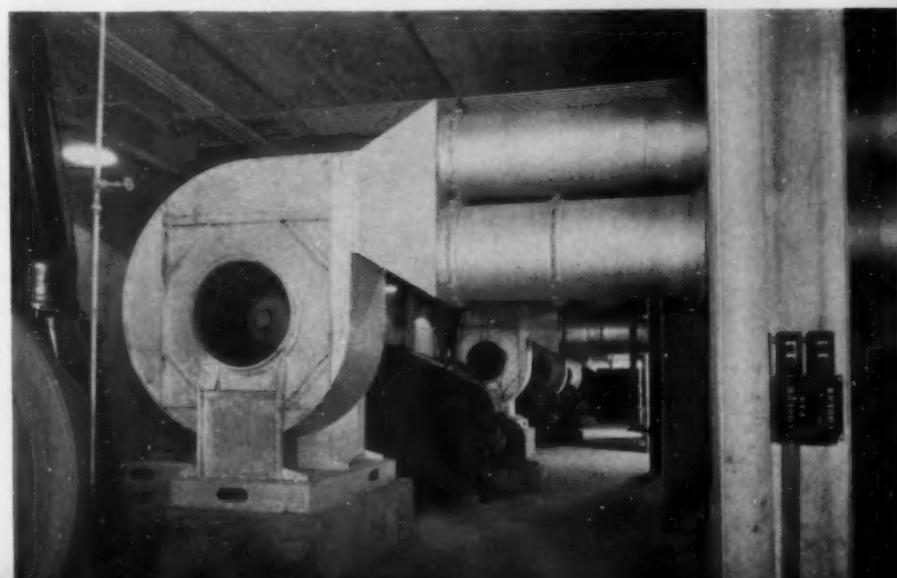


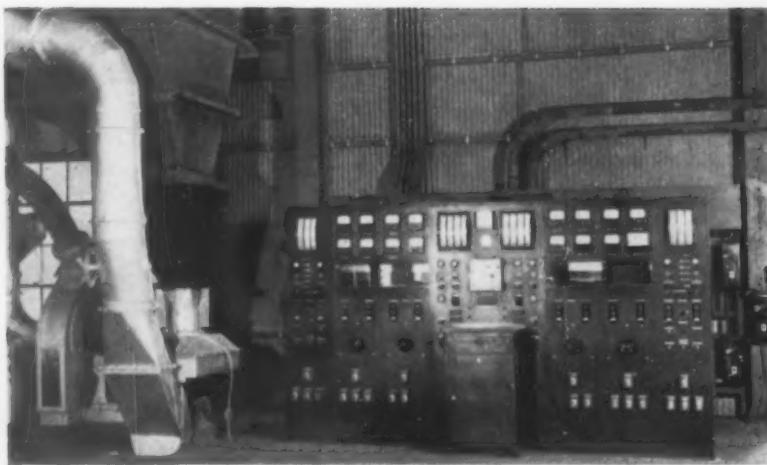
Above: Row of four kiln hoods on left. To the right is one of the coal mill feeders with the instrument board shown in the background

Below: Close-up of one of the kiln hoods, showing automatic tempering damper to control primary air temperatures from coal mill into kiln



Below: Row of clinker cooler fans, two lines from each cooler, one of which is for primary end of cooler and the other is for the secondary end





One of two instrument boards (each for two kilns). On the left is the coal mill feeder and coal bin

cent 2-in. and 80 percent 1½-in. Ball wear is easily compensated for, since new balls are added without shutting down the mill by simply dropping them into an opening at the coal feeder. The mills turn at 30 r.p.m. and are rated at 5000-lb. of coal (and moisture) each per hour at a fineness of 88 to 90 percent through 200-mesh.

The mills are located on the floor below the kiln room and the feeders and the suction fans are on the kiln firing floor. Coal is conveyed into in-

dividual steel bins over the feeders by a Fuller Aervveyor. The bins each hold enough coal of 1-in. top size sufficient for an 18 hr. run. They are equipped with Fuller bin level indicators. The bins hopper down to the feeders below and have been "belled-out" near their bottoms, which has proven an effective means of preventing arching and stimulating a steady flow to the feeder. Each of the feeders is a table feeder driven by a ½-hp. Westinghouse variable speed induc-

tion motor. Each air fan is direct-connected to a 15-hp. motor.

Clinker is burned at about 2800 deg. F. in these kilns and about 30 percent of the combustion air is pre-heated primary air. Most of the secondary air is preheated to about 1000 deg. F., coming from the air-quenching clinker coolers. Air for drying the coal while it is ground in the mill is taken from the kiln hood and is drawn through the tube mill and injected with the pulverized coal, into the kiln burner pipe.

However, more primary air is needed for the kiln operation than can be put through the tube mill. Pulverized coal coming from the tube mill discharge is pulled up a vertical 12-in. diameter pipe to the kiln floor and only about one-third of the primary air is needed to lift the fine coal particles. This volume of air is held at a constant figure in order not to raise particles that are too coarse. In addition, part of the vertical pipe is enlarged to 22-in. diameter, to slow the gases so that any coarse coal particles will drop back into the mill.

Hot air is drawn from the kiln hood and is divided into two branch lines. Ahead of the split is a temper damper at the kiln hood and a cyclone where clinker dust is settled out. One branch line carries heated air, after temper-

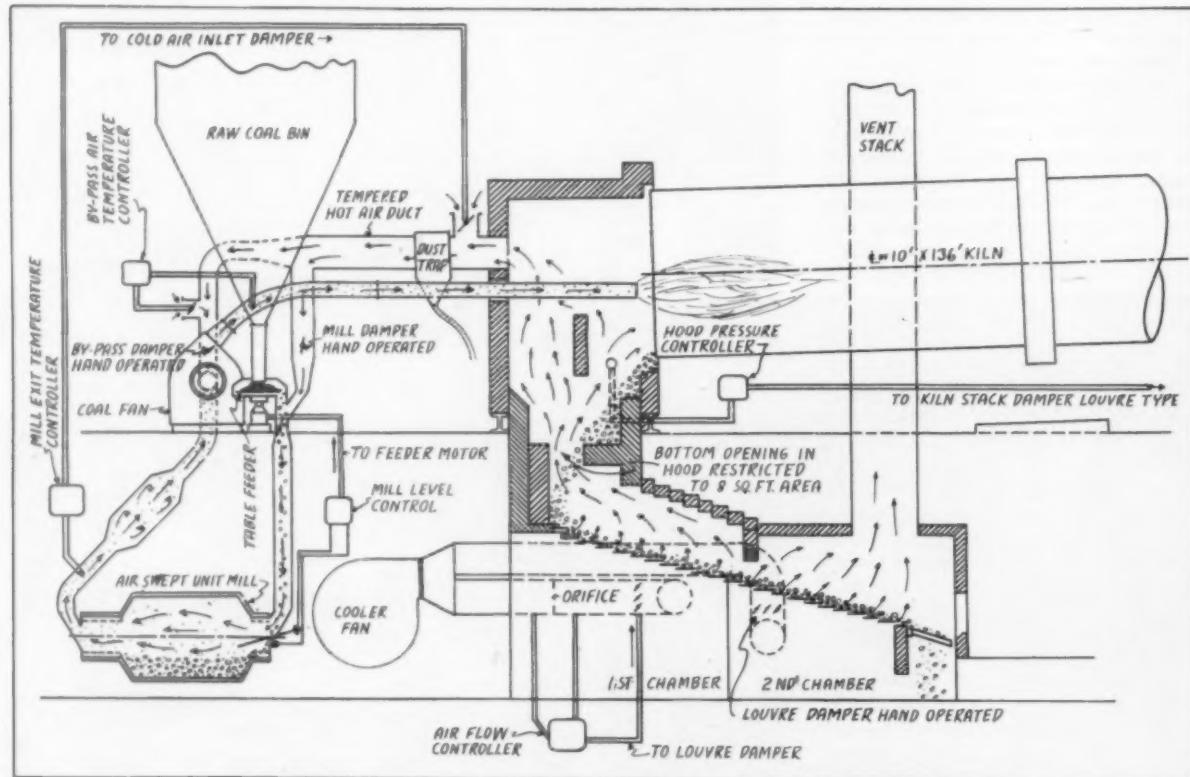
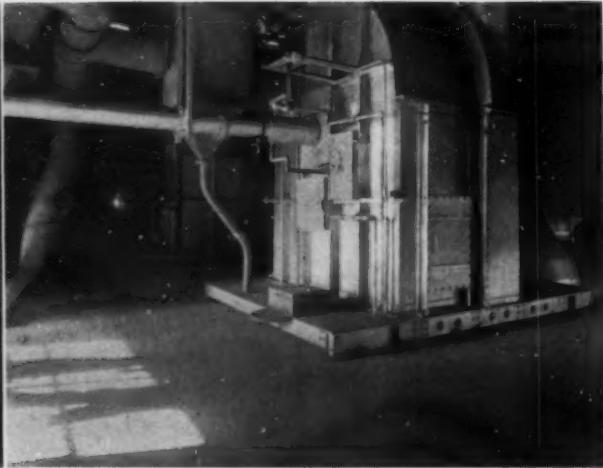
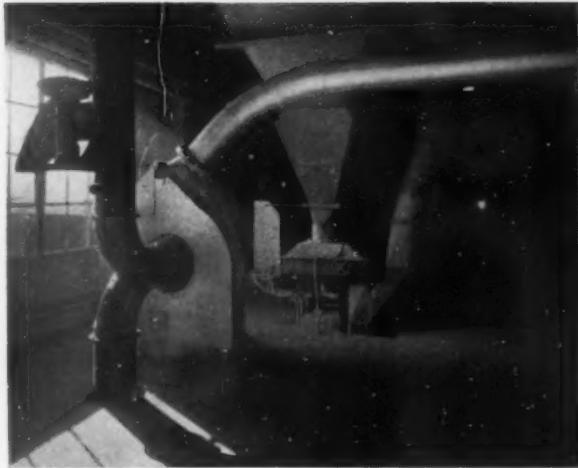


Diagram showing the arrangement of kiln combustion controls for one kiln. On the left, below, is a unit tube mill for grinding coal and just below the kiln hood is the air quenching clinker cooler.



Left: Fan for air-swept tube mill operation. Pipe coming up through floor carries pulverized coal and air from mill. The other pipe, coming from above, and joining it at the fan carries air necessary to deliver enough primary air through the burner pipe which is connected to the top of the fan. **Right:** Kiln hood, showing in the upper left, the split in hot air pipes, one carrying air for grinding coal, the other the rest of the primary air needed for combustion. The two streams join at the fan which forces the coal and air mixture into the kiln

ing, into the vertical pipe through which coal drops from the feeder table down to the tube mill. The junction of the coal and air is just below the feeder.

This is the means of introducing the proper amount of air to dry the coal and lift the pulverized coal up to the fan to be injected into the kiln. The remainder of the primary air goes through the second, or by-pass, line to join the primary-coal mix from the tube mill as it enters the fan to be forced into the kiln.

In order to take care of variations in the moisture content of the coal, the temperature of the air entering the mill is varied by changing the quantity of cold air admitted by the tempering damper. The damper is automatically actuated by a Brown Air-O-Motor in such a manner as to maintain the temperature of the coal laden air leaving the mill constantly at 150 deg. F.

Temperatures of the heated air entering the tube mills are not a consideration. They may run as low as 200 deg. F. or go up as high as 700 or 800 deg. F. depending upon whether the coal contains only a few percent moisture or is unusually wet. Temperature of the extra primary air introduced at the fan is tempered manually by a damper to 250 deg. F.

Mill Level Control

A second automatic control in connection with the kiln firing is the Kennedy automatic mill level control, which regulates the flow of coal into the grinding mills within close limits, for best grinding efficiency and the maximum production of fines.

Variation of the dielectric media (air and coal dust) between the two

plates of a condenser, which consists of a rod extending into the mill and the mill itself, causes a variation of a high frequency current which is generated in an electron tube and passes over a bridge circuit. A detector tube rectifies this high frequency current, which may either be passed over sensitive relays or may be amplified in another tube. The variations of this rectified signal current are utilized to change the speed of the coal feeder motor.

The motor drive on the feeder is capable of these changes within reasonable limits, but should a greater change happen to be necessary for any reason the knives on the table feeders can be adjusted manually.

Balls are added into a mill through the coal feeder spout, on occasion, when indicated as necessary by the mill drive ammeter or by coal fineness tests. Coal finenesses are taken daily. Samples are withdrawn from

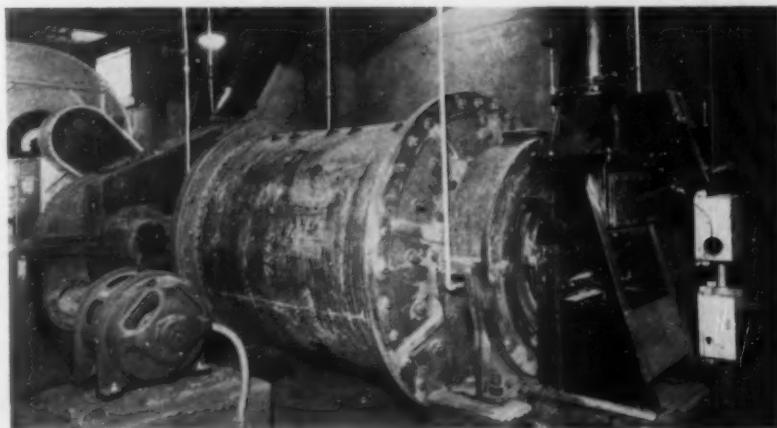
the burner pipes through a valve fitting through which a hollow brass pipe is pushed into the coal stream to predetermined levels so as to obtain a proper cross sectional sample. This pipe is connected to a flexible hose through which an ordinary house vacuum cleaner draws a sample into its bag.

Coal is injected into the kilns through 10-in. diameter water-cooled burner pipes of plain steel that project inside the hoods to within a foot of the end of the kiln. Inside the kiln hood the pipe is protected by a 2-in. covering of insulating cement.

Clinker Coolers

Clinker from each kiln discharges over a 5-ft. by 20-ft. 6-in. Fuller inclined grate clinker cooler (4) where it is quenched by air as it flows over the grates. Two separate air lines from a single fan introduce the air

(Continued on page 42)



One of four tube mills for direct-firing kilns on the floor above. Note mill level control on feed end, right. The other pipe, left, carries pulverized coal up to blower for burner pipe



Main plant of the Becker County Sand and Gravel Co., with unusual loading out tipple shown to the right. Note storage areas surrounding plant with separations which form the reinforced concrete support for the plant superstructure and equipment

Gravel For "Porous" Concrete

Becker County Sand and Gravel Co. meets unusual specifications in furnishing aggregates for big Santee-Cooper power project

GOVERNMENT-FINANCED power and navigation projects under construction in some parts of the United States have assumed the status of defense projects and the tempo of building is being stepped up. These projects all utilize concrete aggregates and the producers having contracts for these materials have had to speed up production to keep pace with the construction.

In the southeastern part of South Carolina, the Santee-Cooper Power and Navigation Project, being built by the South Carolina Public Service Authority, has assumed great importance as a source of power for industrial operations and will ultimately consume about a million tons of aggregates.

This is a \$41,000,000 project, located within 50 miles of Charleston, that includes the construction of Santee dam, and Pinopolis dam, both of earth construction, with concrete spillways, locks and power houses. Like all major construction developments, this one offers some new specifications for materials and has some novel features for which special aggregates must be produced.

Meeting Difficult Specifications

Becker County Sand and Gravel Co., Inc., with headquarters at Crosby, Minn., has the contract for gravel, which is produced at Cheraw, S. C., 100 miles by rail from the project, and is producing the sand at Bonneau, S. C., near the site.

In November, 1939, gravel production was started at Lugoff, S. C., and an estimated 370,000 tons were pro-

duced at that location. A new deposit was opened up near Cheraw and production started there on March 26, 1941, to complete the previous contracts, and to fulfill new contracts more recently let. The newer plant has greater capacity than its predecessor, has some additional equipment and more gravel available within a reasonable hauling distance. New contracts called for 400,000 to 500,000 tons of washed gravel for slope protection work plus a residue of about 100,000 tons assumed earlier.

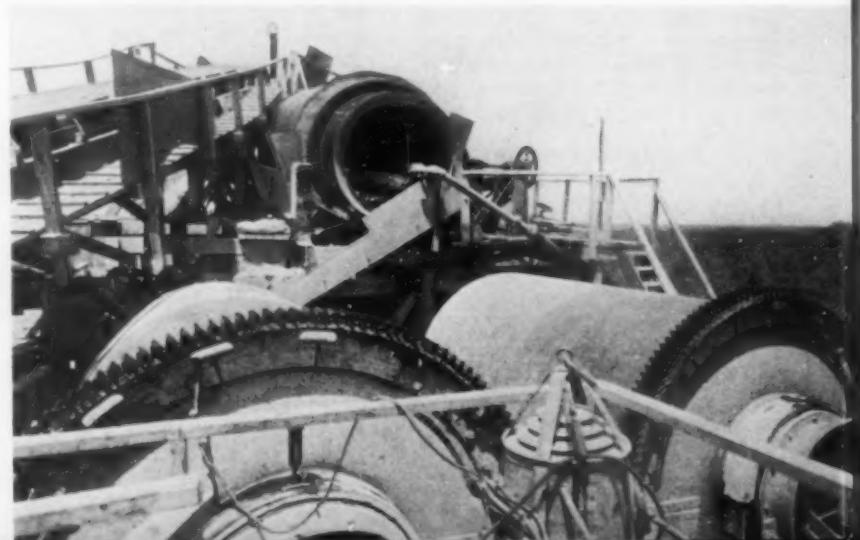
Gravel for concrete, contracted for earlier and still being produced, is in three sizes. These are a 2½-in. maximum size calling for 0 to 5 percent retained on a 2½-in. screen, 75 to 100 percent on a 1½-in. screen, and 95- to 100 percent retained on ¾ in.; a 1½-in. maximum size with limits of 0 to 7 percent on 1½ in., 40 to 60 percent on 1 in., 85 to 100 percent on

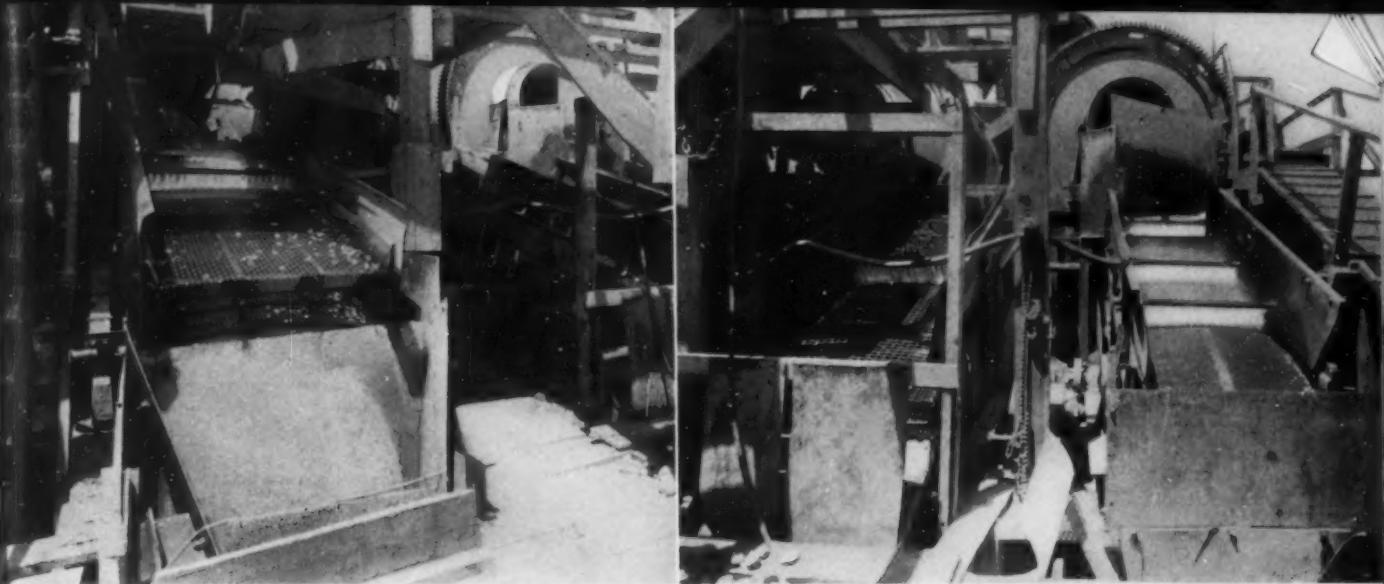
¾-in. and 95 to 100 percent retained on the No. 4; a ¾-in. maximum size limited to 0 to 5 percent on a ¾-in. screen, 40 to 60 percent on ¾-in., 85 to 100 percent on No. 4 and 95 to 100 percent retained on the No. 8 sieve.

Aggregates for Porous Concrete

New contracts, for slope protection work, are for smaller sizes, to be used for an unusual type of construction. Slopes of the dams and dikes will be protected by a porous concrete laid over a base course of gravel. Porous concrete is being mixed without fines, and only one coarse size of aggregate is used. This gravel must conform to the requirements of A.S.T.M. designation C-33-37T. No more than 5 percent is permitted retained on a ¾-in. screen, 10 to 60 percent must be retained on a ¾-in. screen, 82 to 90 percent on a No. 4 and not less than 95 percent on the No. 8.

Two blade mills which receive a split feed from the scrubber screen above. Large scrubbing capacity was necessary to get rid of the clay



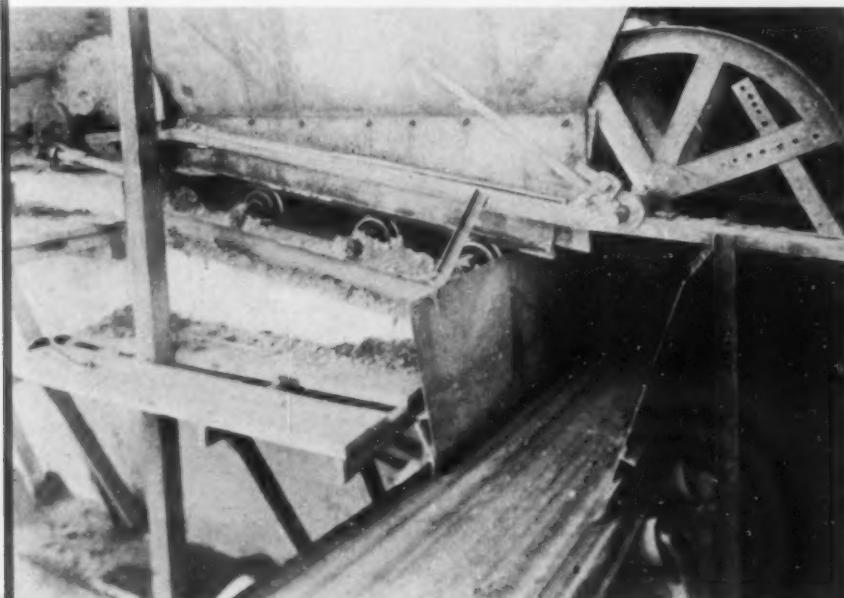


Left: This screen sizes gravel which has been crushed at a lower level and elevated back to the screen. **Right:** Showing blade mills for scrubbing, one receiving a plus $\frac{3}{4}$ -in. feed, the other a minus $\frac{3}{4}$ -in. feed from the scalping screen above. After scrubbing, gravel is passed over vibrating screens, below.

Base gravel, being placed as the foundation for porous concrete, class F material, is limited to 5 percent retained on a $\frac{1}{2}$ -in. screen and a maximum of 20 percent passing 8-mesh, which is cutting into the nor-

being operated on two 10-hr. shifts and is shipping about 50 standard cars a day.

Much of the equipment at Cheraw was in operation at Lugoff but the design is different in some respects;



Reciprocating feeder set at right angles to the belt to facilitate handling wet, sticky pit run material

mal size brackets for concrete sand. However, concrete sand is being produced at another location. Probably 300,000 tons of the $\frac{3}{4}$ -in. aggregate for porous concrete will be produced and 100,000 tons of class F blanket gravel. The plant will operate at least a year on these contracts.

Plant Operations

Capacity of the Cheraw plant, in gravel alone, is 200 tons per hour as compared to 150 tons for the dismantled Lugoff plant. The plant is

and there has been added a reduction crusher, bucket elevator and additional scrubbers. The new plant has triple the capacity in scrubbing equipment, as a result of experience gained in handling the raw material, which is similar for the two deposits.

Proportions in the deposit are 40 to 50 percent gravel, with a top size of 3-in., 35 percent natural sand which is largely wasted, and 15 percent foreign material which is largely silt and clay that is sometimes very sticky, with a tendency to ball up.

A 15-ft. gravel and sand bed cleared by the removal of 4-ft. of overburden is being excavated by a Lima 801 Diesel-powered dragline with a $2\frac{1}{2}$ -cu. yd. Page bucket. Haulage equipment consists of eight bottom-dump Euclid semi-trailer "Trac-Trucks" carrying 10 cu. yd. of matrix to a hopper feeding out to a primary belt which carries the material to the head of the plant. The plant equipment, including the crusher, is superimposed over open-type bins from which the finished products are withdrawn by a tunnel belt conveyor, put over a rinsing vibrating screen and transferred to a second belt conveyor loading direct into cars.

Pit run material is dumped over 9-in. spaced grate bars into a hopper of 28-cu. yd. capacity from which it is paid out to a 36-in. inclined Link-Belt primary belt conveyor, on 300-ft. centers, by a 9-ft. by 42-in. Link-Belt reciprocating feeder.

Because of the nature of the material, which is often sticky, the feeder is set perpendicular to the primary belt, to parallel the hopper above and permit the use of a hopper with steep sides. The feeder tilts downward 1-in. to the foot to discharge its contents on to the belt conveyor.

Sticky Material Requires Washing

Plenty of water and scrubbing capacity are utilized in the plant, with the first application of water made at the conveyor head pulley where the material dumps into a wash box over the primary screen. An estimated 2000 g.p.m. of water are utilized in the washing plant, furnished at 40 p.s.i. pressure from the Pee Dee river, 3000 ft. from the plant. Two 8-in. Fairbanks, Morse high pressure centrifugal pumps, one a booster, supply the plant with water.



One of the large semi-trailer hauling units ready to dump 10-cu. yd. load into hopper to feed main belt to plant. "Electric eye" checks loads

All the pit run material is put through a revolving scrubber-screen where an 8-ft. scrubbing section is followed by a 14-ft. length of screen to split the gravel at $\frac{3}{4}$ -in. and scalp out the sand through a sand jacket. The sand jacket has $\frac{1}{2}$ - x $\frac{1}{2}$ -in. openings and the inside screen diameter is 5 ft.

Plus $\frac{3}{4}$ -in. (up to 3-in.) material is diverted to an 8- x 14-ft. Allis-Chalmers blade mill which contains about 10 tons of gravel as it rotates. Minus $\frac{3}{4}$ -in. material is put through an identical blade mill.

Minus $\frac{3}{4}$ -in. products coming from this scrubber flow over a 4- x 10-ft. double-deck Link-Belt vibrating screen. A top deck screen cloth with $\frac{1}{4}$ -in. sq. openings takes part of the load off $\frac{1}{2}$ -in. cloth below, with the retained material dropping into the $\frac{3}{4}$ -in. gravel bin. Minus $\frac{1}{2}$ -in. fines launder to waste or may be diverted to sand screw washers.

Plus $\frac{3}{4}$ -in. from the other blade mill flows over a 4- x 10-ft. triple-deck Link-Belt vibrating screen which, at the present time, usually has $1\frac{1}{2}$ -, $\frac{3}{4}$ - and $\frac{1}{2}$ -in. screen cloth on the three decks consecutively from the top to bottom. Plus $1\frac{1}{2}$ -in. is conveyed over a picking belt, where some soft shale and clay is hand-removed, to a 4-ft. Symons short head cone crusher.

Two finished products are taken off this screen, $\frac{3}{4}$ - to $1\frac{1}{2}$ -in., and $\frac{3}{4}$ - to $\frac{1}{2}$ -in., which are dropped into bins. To balance production, sometimes all the plus $\frac{3}{4}$ -in. gravel is put through the crusher.

A Lippman bucket elevator returns the crusher discharge to the screening floor for passage over a 4- x 12-ft. three-deck Robins vibrating screen. Ordinarily this screen has $\frac{3}{4}$ -in., $\frac{1}{2}$ -in.

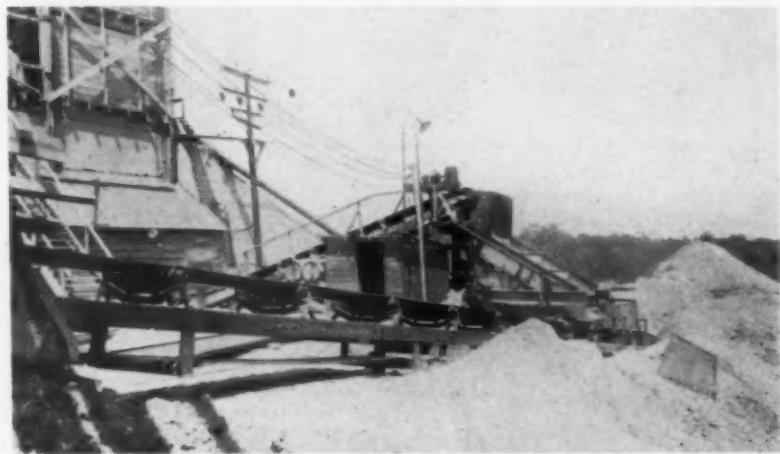
wasted. This sand is dropped into two 5- x 8-ft. Telsmith automatic discharge sand tanks and all the overflow from the tanks is laundered to waste. Sand discharged through the bottoms of the tanks is dewatered through Eagle screw washers, identical in size to the other pair.

At times, the discharge of sand from this washer is flumed over a 4- x 5-ft. double-deck Tyler Hum-mer vibrating screen, operated as a single-deck screen to catch plus 8-mesh sand to go into class F gravel ($\frac{1}{2}$ -in. to 8-mesh). The rest, along with the overflows from the washers, is wasted.

Live storage capacity, reclaimable to a tunnel belt, is 20 cars of gravel in five bins. In loading cars, either grade of gravel or any blend is withdrawn on to a 36-in. Link-Belt tunnel belt conveyor, 160-ft. centers, which discharges over a 4- x 10-ft. double-deck Link-Belt vibrating screen for rinsing, and then transfers to a second belt for direct car-loading. This screen could be easily pressed into service for re-sizing if needed. The loading belt conveyor has a 36-in. belt on 150-ft. centers. Shipments are made on the Atlantic Coast Line railroad. Siding facilities include tracks for 50 empty cars, of either gondola or flat bed type, dropped by gravity to the loading tipple, and provide for 50 loaded cars. The plant is 100 percent electric-powered.

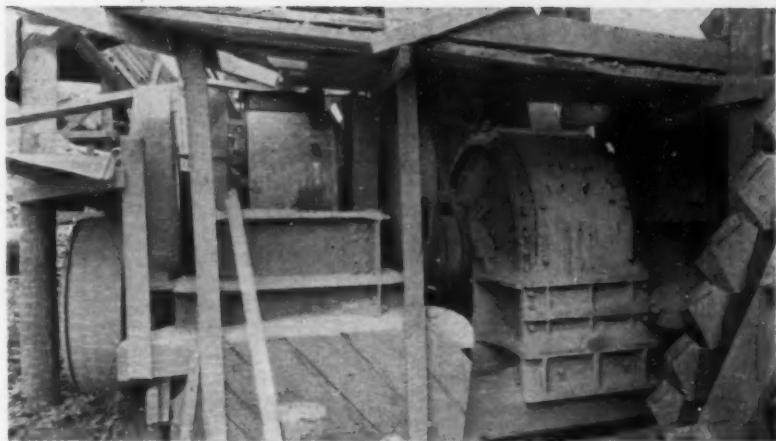
Practically all the concrete sand is produced by the Becker company near the damsite. The specification on grading requires that 0 to 5 percent be retained on the No. 4 sieve, 0-15 percent on No. 8, 15-35 percent on No. 16, 40 to 60 percent on No. 30, 75 to 88 percent on No. 50 and 93 to 99 percent on the 100 mesh. Engineers have allowed in these specifications, for the blending of extremely fine

(Continued on page 42)



Reclining belt under bins discharges over rinsing screen, right, and then transfers to earloading conveyor belt in foreground

Three reduction crushers operating below scalping screen. To the left: Roll crusher to reduce a 1½ to 4½-in. material to minus 3-in. Center: Impact type crusher to reduce oversize from scalper (4½-in. size). Right: Cone crusher which is used to reduce plus 2-in. from the double-deck sizing screen to which is elevated the products of the rolls and impact crushers



Six Diesels Operate Stone Plant

ILLUSTRATIONS show a completely Diesel-powered crushed stone plant built by Lambert Bros., Inc., Knoxville, Tenn., to produce several hundred thousand tons of stone for the new plant of the Aluminum Co. of America near Knoxville. Production started early in 1941 between Knoxville and Maryville near the construction site.

A new quarry was opened and the plant was built to have a capacity of 150 tons per hour within a size range from ¼- to 2½-in. A quarry face 90-ft. high was developed, on 24-ft. benches, using wagon drills followed

Lambert Bros., Inc., furnishes aggregates for big aluminum plant with Diesel-operated units

by jackhammers for secondary drilling, and with ¾-cu. yd. gasoline shovels, a Lorain and a Northwest, for excavating the stone.

It has four crushers of four different types. Trucks (end dump) delivered the stone, six tons in a load, to a hopper, from which a Cedar Rapids pan feeder, with a clutch

throw-out, fed the stone into a 25-x 40-in. Cedar Rapids Jaw crusher. A 30-in. belt conveyor delivered the stone, all minus 6-in., to a 4-x 8-ft. double-deck Telsmith scalping screen.

Just below the screen are three reduction crushers. The overs (plus 4½ in.) from the top screen deck were put through a Cedar Rapids "Kubit" crusher for a reduction to minus ¾ in.; while a 1½- to 4½-in. size passed into a 20-x 40-in. Pioneer rolls for a reduction to minus 3-in.

Both crusher products were elevated to a 4-x 10-ft. Telsmith double-deck sizing screen. Oversize (plus 2



General view of Lambert Bros. Inc., crushing plant. In the foreground is the scalping screen receiving material by belt conveyor from the primary crusher under the truck ramp

in.) was routed to a Symons cone crusher below and returned to the screen, with the finished stone dropping into bins. All minus $\frac{1}{4}$ -in. stone was put through a 16-in. Telsmith screw washer, where water was added to wash out excess fines and produce a crushed "sand." This product, also, was dropped into a bin for direct loading into trucks (from all bins). The haul to stockpiles at the aluminum plant is 3½ miles. Sand is about one-third of total production.

Four Diesel Engines

The entire plant is powered by Diesel engines. A 90-hp. Cummins engine was the drive for the primary crusher and its feeder; with two 110-hp. Caterpillars driving all the other equipment and an 85-hp. GMC Diesel engine to drive a 6-in. water pump. All the drives were through flat belts and line shafts.

Drills for the primary blast holes were rented on a footage basis; with a 110-hp. Caterpillar driving one air compressor and a 110-hp. International Diesel driving another. The compressors were a Gardner-Denver and a Chicago Pneumatic, each of 350 f.p.m. capacity.

George Lambert is vice-president and manager of Lambert Bros., Inc., and Ray Lambert is in charge of production. The company operates other plants, some of them temporary, throughout eastern Tennessee.

Gravel for Porous Concrete

(Continued from page 40)
sands with this product in the batching operations at the concrete mixers.

The sand under excavation is covered with 4 ft. of overburden. Excavating equipment includes a 1½-cu. yd. Northwest dragline equipped with a Page bucket, and 5-cu. yd. Ford trucks to deliver the material to a hopper feeding a 24-in. belt conveyor on 225-ft. centers. Oversize (plus $\frac{3}{4}$ -in.) from a 4- x 10-ft. Link-Belt double-deck vibrating screen is placed in a bin and hauled to stockpiles. Cleaning is done through a log washer, and minus 3/16-in. material is fed to three pairs of Eagle screw washers to produce the sand. Dewatered sand is stockpiled by a stockpiling belt conveyor, as produced at the rate of 100 tons per hour. This plant has been in operation 18 months.

Operations of both plants are under the supervision of E. A. Mullen, vice-president and general manager with headquarters at Cheraw, South Carolina. M. C. Evans is superintendent at Cheraw and C. D. Richards is office manager.

Direct Firing With Tube Mills

(Continued from page 37)

through the primary, or quenching, section and through the secondary section of the cooler which are separated by a partition. That air pre-heated by the clinker in passing through the primary end of the cooler constitutes the secondary air needed by the kiln for combustion. The clinker discharged from the cooler is at air temperature, or slightly more, and is conveyed direct to storage.

This plant stores clinker in two concrete silos of 10,000 bbl. capacity each. A drag chain followed by a bucket elevator put the clinker into the silos, after the oversize (plus 1-in.) is first put through a jaw crusher over the silos. Clinker is withdrawn in the same way for grinding.

Operation Controls

Clinker is burned in the new kilns, with 10 percent excess air, and a draft of .05-in. of water measured inside the kiln hood. The draft is held constant by a Brown automatic draft control which operates the louvres at the kiln stack fans to control the volume of gases through the kiln. The combination of a constant rate of feed of pulverized coal and automatic regulation of the flow of air keep constant burning conditions inside the kiln. Kiln operations are completely instrumentalized, at two large electric panelboards, each of which accommodates two kilns. Each kiln has a Brown optical pyrometer focussed through a peep-hole in the kiln hood upon the kiln lining. Hot zone temperatures as measured by the instrument are continuously recorded on a Brown Potentiometer, along with the kiln revolutions and the rate of feed of raw material into the kiln.

The pyrometers are a means of having a continuous temperature record and to indicate at a glance when adjustments are needed. Volume of air into the kilns is never changed. If kiln temperatures vary sufficiently to require a change, the kiln speed is adjusted at the panel-board by resetting the kiln drive rheostat, and the kiln feed drive rheostat automatically changes with it.

Another Brown continuous recording chart shows the dust chamber temperature and the gas temperature just after the economizer. Draft inside the kiln hood is indicated on a gauge and other instruments indicate the temperature of the air entering the mills, air flow through the coolers and there are ammeters for all equipment. All the instruments are Brown with the exception of

Weston ammeters and Hays instruments to measure the air flow to the primary end of the clinker coolers.

There are a series of lights on the board that indicate how fast the tube mill coal feed motor is running and which therefore are a positive indication of how the tube mill coal level is being maintained. The different lights go on and off as the motor speed varies and, as the rate of feed is always under adjustment according to the mill load, the lights keep changing within the limits the feeder motor is rotating. Should the top light come on, or the bottom one, indicating extremes, a horn will sound and an adjustment will be made to the table feeder. When any of several horn signals on the board are shut off, the instrument board will flash a light to show the operator what piece of equipment caused the alarm to sound.

More Cement Storage For Allentown

THE ALLENTOWN PORTLAND CEMENT Co. is completing an additional set of cement storage silos at its plant at Evansville, Penn. The new silos will have a capacity of 100,000 bbl.

These silos comprise six cylindrical bins, 28 ft. in diameter, arranged in two rows, providing two interstice bins. The cylindrical bins will be provided with steel conical bottoms, each closed by a 14- x 24-in. Fuller rotary valve. Each interstice bin will discharge through a single spout closed by a similar valve. The height of the silos will be 105 ft., from the ground level to the underside of the roof slab, or 90 ft. above the upper edge of the conical bottoms. The design does not include a monitor.

The new group is in line with the present silos, but is spaced at sufficient distance to permit the erection of a new pack house between them. A steel bridge will provide access from the old to the new silos. This bridge will carry extensions of the two present pipe lines of the Fuller-Kinyon systems which transport the cement from the two finish mill air separators.

Cement is conveyed from the present silos to the present pack house, and to cars for bulk loading, by two portable 8-in. Fuller-Kinyon pumps, through independent 8-in. pipe line systems. These pumps run on parallel tracks below the bins. The tracks and pipe lines will be extended under the new silos, and through the pack house basement.

Crush Million Tons of Stone For T.V.A.

Birmingham Slag Co., enlarges plant capacity from 80 to 400 tons per hour for Cherokee dam, supplying power for big defense aluminum plant

CHEROKEE DAM on the Holston river near Jefferson City, Tenn., recently completed by the Tennessee Valley Authority, is to be a power project vital to national defense in the Knoxville area. When completed, the dam is to develop electrical power for the Aluminum Company of America's enlarged plant which is being built near Knoxville. The dam is of mass concrete construction.

To keep pace with construction, aggregates for the concrete were produced at break-neck speed at two locations for shipment to the damsite. Birmingham Slag Co. of Birmingham, Ala., was awarded the contract to produce and deliver something over a million tons of crushed rock for coarse aggregate and has sublet the fine aggregate contract to the American Limestone Co. of Knoxville. The



Above: Screening tipple for smaller sizes of stone. Note stockpiles over tunnel reclining belt conveyor in lower right

Left: From left to right, J. G. Graham, superintendent of the plant; R. S. Burgess, general superintendent; and J. O. Norton, assistant plant superintendent

latter company, which produced 400,000 tons of manufactured stone sand as its share at Mascot, Tenn., leased its quarry and plant at Strawberry Plains, Tenn., to the Birmingham Slag Co. to produce coarse aggregates.

Producing facilities at Strawberry Plains were limited to 80 tons per hour of crushed dolomite and limestone which was far short of requirements for a project of this size. In 30 days time the Birmingham Slag Co.

View of the quarry showing Diesel-powered shovel loading 12-cu. yd. capacity trucks. Inset: Close-up of new well drill sinking 9-in. holes to a depth of 120-ft.





Two vibrating screens which receive minus $\frac{3}{4}$ -in. feed and size it down to No. 4

installed large capacity equipment into existing superstructures and began producing the aggregates at the rate of 400 tons per hour. Production began November 15, 1940. This unit probably has the largest capacity of any single crushed stone plant in the South and was built to handle the stone as fast as it could be put to the primary crusher. It was designed for a minimum of bottle-necks. Two-shift operation, five days a week, was employed, since failure to meet minimum deliveries per month to the damsite was subject to penalties and it was the producer's desire to keep stockpiles at destination well ahead of the minimum requirements.

Some of the equipment in operation in the original plant was utilized, including three vibrating screens and a crusher and some of the quarry equipment, including well drills, power loading equipment and quarry trucks.

A 42-in. Allis-Chalmers gyratory crusher driven through V-belt by a 250-hp. electric motor replaced a smaller one at the foot of a belt conveyor incline on the quarry floor. Secondary crushing and scalping was done, as before, at the head of the

incline above the quarry and fine sizing was completed on a screening tipple located back in the quarry but at a higher level than the quarry workings. Small sizes are stored in open partitioned stockpiles beneath this tipple, with a tunnel belt conveyor for reclaiming out of stockpiles direct to railroad cars. Belt conveyors are the means of intra-plant transportation throughout the entire plant.

Aggregate Sizes Have Limited Tolerances

Four sizes of coarse aggregates were required by the T.V.A. as follows:

Size Range	Production of Each Required (percent)
3-in. to 6-in.....	30
1 $\frac{1}{2}$ -in. to 3-in.....	25
$\frac{3}{4}$ -in. to 1 $\frac{1}{2}$ -in.....	20
No. 4 to $\frac{3}{4}$ -in.....	25

Permissible tolerances in gradation were limited to 10 percent on the top sieve size of each product except for the cobbles (3- to 6-in.) where only two percent was allowed to exceed 6-in. in size. Ten percent was the permissible tolerance on the bottom

side in testing the two smaller sizes and 15 percent in the case of the coarser aggregates. All these limitations were satisfied, but with the most difficulty in the production of No. 4 to $\frac{3}{4}$ -in. stone under wet weather conditions. Electric vibrating screens sized this product. The main plant sized all the aggregates without the application of washing water, and the bulk of the stone was shipped dry. Some washing was done over a vibrating screen at the car-loading tipple when heavy rains and clay contamination required it.

Quarry Excavated at Two Levels

The quarry was excavated at two levels, with three shovels in operation at three different locations, since the challenge was to get sufficient stone to the primary crusher, which could handle 750 tons of stone per hour crushed to 8-in. top size. A new 3 $\frac{1}{2}$ -cu. yd. Diesel-powered Lima shovel on crawler treads and a 2-cu. yd. 37 electric Marion shovel were supplemented by a 2 $\frac{1}{2}$ -cu. yd. 70C Bucyrus-Erie steam shovel from the old plant to keep the operations going. Three of the leased electric churn drills from the former plant drove blast hole drills 5%-in. in diameter to the depth of the face under work and a new 29-T Bucyrus-Erie electric well drill sank 9-in. holes on a 120-ft. face. The large holes were spaced 25-ft. apart with a 30-ft. burden and the others were 15- and 18-ft., respectively. DuPont Nitramon was used in all the primary shots with Primacord to set off the charges. The biggest blast so far has brought down 125,000 tons of stone.

Haulage equipment in the quarry comprised five new 6-cu. yd. Koehring Dumptors powered by General Motors Diesel engines, three 12-cu. yd. Hug trucks driven by Cummins Diesels and four of the 8-cu. yd. Mack gasoline-driven trucks which were leased from the quarry owners.

The Dumptors are forward dump, the Hugs are end-dump and the



Three views of different type trucks dumping into primary crusher. Both end and side-dump units are used



Close-up of crushing plant and loading tipple. Secondary cone crusher is on concrete foundation. Loading belt and hopper for cobbles is over car. Note air-operated bin gate used in loading cars from hopper

Macks side-dump, and it was common practice to dump into the crusher from a Mack truck while dumping at the same time from either of the other two types of haulage equipment.

Crushing and Sizing Operations

Stone from the primary crusher discharged on to a 42-in. Goodrich conveyor belt, 220-ft. centers, which transferred to a second belt on 250-ft. centers, delivering to a 5- x 12-ft.

over tracks of the Southern railroad. An air-operated gate was the means of dumping into a car.

Oversize (plus 6-in.) was put through a 5½-ft. Symons cone crusher and the minus approximately 3½-in. stone product was elevated to a 100-ton surge bin. On occasion 3- to 6-in. stone was also put through the cone crusher to balance production.

Stone was withdrawn from the surge bin over a 48-in. Jeffrey-Tray-

conveyed by belt to the screening tower for separation into finer sizes and storage over the reclaiming tunnel conveyor. The first separations were made over two 5- x 9-ft. double-deck Niagara screens and the smallest size was produced over 4- x 7-ft. Jeffrey-Traylor single-deck vibrating screens.

Screen Wet Material Before Loading

Stone from open stockpiles was reclaimed over a 30-in. belt for direct loading, as dry stone, into cars or by first passing it over a 6- x 12-ft. single-deck Niagara vibrating screen in the loading tipple. This screen was only used when washing was necessary, due to unfavorable quarry conditions induced by wet weather. All shipments were inspected and tested at the contractors' stockpiles, 15 miles by rail from the producing plant.

To keep the plant in production, a complete repair shop was available at the plant. D. F. Shaw, chief engineer of the Birmingham Slag Co., designed the plant, which comes under the supervision of R. E. Burgess who is general superintendent of the company's producing plants outside the Birmingham area. J. G. Graham is plant superintendent, assisted by J. O. Norton who is superintendent of the Strawberry Plains operations of the American Limestone Co. Mr. Norton's services were loaned to the Birmingham Slag Co. for the duration of the contract.

General headquarters of the Birmingham Slag Co., are at Birmingham, Ala. C. E. Ireland is president; C. B. Ireland is vice-president; and G. C. McCullough is vice-president and general manager.



General view of plant. Crushing and scalping plant is shown to the right, screening tipple for small sizes to the left, and tunnel below for reclaiming direct into cars

Allis-Chalmers type B double-deck vibrating scalping screen. The primary belt is of 6-ply cord construction to withstand the impact of large stone coming from the crusher.

Cobbles (3- to 6-in.) were sized between the two decks of the scalping screen and conveyed by belt to a surge bin of one-car capacity directly

to a vibrating feeder on to a belt conveyor which placed it over a second vibrating scalping screen, a 5- x 12-ft. single-deck Niagara. Plus 3- or 3½-in. stone was put through a 4-ft. Symons cone crusher which was closed-circuited by belt conveyors with the screen.

Throughs from this screen were



Wet plant of the American Limestone Co., which was built to make stone sand. Belt conveyor inclining up to building containing two pairs of settling cones. Overflows launder to bowl classifier, in center foreground.

Stone Sand For Cherokee Dam

Crush and screen stone without application of water, but use hydraulic classifier to control fines from dry plant

MANUFACTURED LIMESTONE SAND is being produced by the American Limestone Co., Knoxville, Tenn., a subsidiary of the American Zinc Co. of Tennessee, at its Mascot, Tenn., plant. A new all-steel plant was built early in 1941 which is one of the largest capacity stone sand operations in the country. Production runs from 90 to 100 tons per hour. It was built to furnish the fine aggregate for construction of Cherokee dam, newest of the T.V.A. series, on the Holston river northeast of Knoxville. Expansion of the aluminum production in the Knoxville area had placed completion of this dam on an emergency status—as a needed source of power.

T.V.A. specifications for stone sand are rigid. Close tolerances must be met through seven sieves, on gradation, for this contract. Gradation of the sand must meet the following:

By BROR NORDBERG

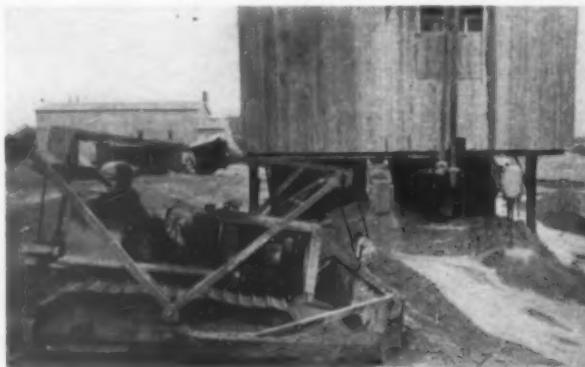
Percent Passing	Sieve
95-100	4-mesh
75- 90	8-mesh
50- 70	16-mesh
30- 50	30-mesh
15- 30	50-mesh
8- 13	100-mesh
0- 5	200-mesh

It is apparent from the above that the plant must have flexibility, especially since operations are on a 24-hr. day basis. Each car of sand is sampled by T.V.A. engineers, and grading and other tests are made in a laboratory at the plant. The cars are hopper-bottomed and core samples are taken from each of three piles of sand placed in a car. Gradation tests are made from a 5000-gram sample coming out of each car.

Raw material for the stone sand plant is a dolomitic limestone that is a by-product from the zinc extraction operations of the parent zinc company plant nearby. This stone is a mined material that has been already crushed, washed and accumulated in large stockpiles from which it is reclaimed to the sand plant.

Stone Sand Made from Zinc Mining By-Products

The plant that was built crushes and screens the stone without the application of water and also has a hydraulic classification unit to regulate and overflow the excess fines from a controlled size of feed to it from the "dry" plant. Adjustments are made as needed in either, or both, the dry and wet operations to arrive at the required gradation. The stone is free from objectionable or deleterious ma-



Left: "Dosing" newly made sand away from plant to drain. Note sand flowing through spouts from overhead cone tanks.



terial to begin with and requires no washing for that purpose.

Size range of the raw material for the stone sand plant is from No. 4 to 1½-in. top size, with the larger percentage above ¾-in. Crushing to fine sizes is done by two 54-in. diameter and 24-in. wide sets of Allis-Chalmers smooth-faced rolls. One set serves as a primary breaker and the other as a finishing crusher which receives as its feed rejects from four 5- x 12-ft. single-deck Allis-Chalmers low-head vibrating screens that are in closed-circuit with it.

A combination of slackline buckets and belt conveyors delivers the feed stone to the primary crusher. Two slackline cableways, each with a 1-cu. yd. drag bucket powered by a 2-drum Ingersoll - Rand cable hoist, deliver stone into separate hoppers, and 24-in. inclined belt conveyors, 120-ft. centers, carry the stone to a central hopper.

Manufacturing Methods

An oscillating pan feeder feeds the stone out from this hopper on to a 24-in. cross belt conveyor, 135-ft. centers, which feeds the first of the two sets of rolls.

This crusher is set to crush all its



Pair of horizontal screens sizing feed from primary rolls. Overs from these two go to cross belt conveyor for delivery to the secondary rolls. Throughs go to the wet plant for classification

feed to minus ¾-in. size, and a 36-in. inclined belt conveyor, 92-ft. centers, carries the crushed product into a screening plant that is separate from the crusher building. The stream of stone is split equally over the four horizontal screens which are arranged on one floor in pairs, two discharging their overs to a common belt conveyor on one side of the plant and the

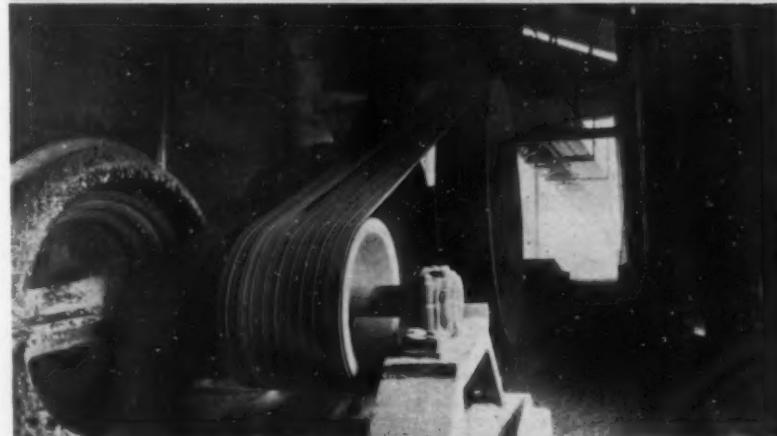
other two in the same way on the other side.

These screens are equipped with screen cloth that will closely control the product to be sent to the wet plant for classification. Each has three equally-sized panels of spring steel wire cloth, having square openings of 0.198-in., 0.117-in. and 0.115-in., from the feed end to the discharge end respectively.

Oversize from each pair of screens flows on to a 24-in. belt conveyor, 35-ft. centers, which transfers to another 24-in. belt on 89-ft. centers that returns these rejects to the crushing plant. All these returns go to the second set of 54-in. rolls, which are set up for a maximum size of product not to exceed ¼-in.

The product of this set of rolls is returned to the screens, and the fines from the four vibrating screens are conveyed to the wet plant over a 24-in. belt conveyor on 250-ft. centers. Rate of feed to the dry plant and adjustment of the screen openings are two of the methods used to adjust the capacity of the product delivered to the wet plant and the ultimate gradation of the finished product. Locomotive tire steel is used on the crushing rolls and care is taken that a ribbon feed of stone be introduced into each set of rolls. A fairly even size of stone, without a wide average range from top to bottom size, is the feed into the primary rolls to begin with, while the second set of rolls receives a fairly uniform smaller size of feed, which is conducive to good efficiency in crushing by rolls.

Classification to meet the required gradation is controlled in either of several ways in the wet plant, while also disposing of excess fines, and the flow of material through this plant is



Above: Primary 54-in. smooth-faced rolls having a motor for each roll. Below: Other end of drive for roll crusher



Reclaiming conveyor, left, bringing stone from stockpiles and storage bins to crushing and screening buildings, center. Wet plant is to the extreme right

designed so that a uniformly blended material is produced, by inter-mixing the several products from the classifiers and settling tanks. Approximately 800 g.p.m. of water is required.



Pushing sand to hopper for carloading



Close-up of tractor and "dozer"



Taking sample from car of stone sand

Dry material from the previously described crushing and screening plant is conveyed to a discharge box where water is added from a 6-in. line and a split made into two 5-ft. diameter Link-Belt circular cones. These cones are settling tanks of the automatic discharge design, with adjustable weights on levers to regulate the thickened discharging material.

Hydraulic Classification

Discharging material from the cones, which is part of the final product, drops through a spout on to the ground. This plant has no storage in bins, but utilizes ground storage which is above the level for car-loading.

Overflows from both these cones are split into two additional 4-ft. cones, which are simple settling areas to catch some of the intermediate sand sizes. That part of the sand that settles in each of these two cones is pumped by each of two 4-in. Wilfley sand pumps into the discharge box through which the original feed enters the two 5-ft. automatic cones.

Overflows from the second pair of

tanks are laundered into a 30-ft. Dorr bowl classifier which functions principally as a large settling area. Air agitation in the bowl is used to get rid of excess fines, which go to waste. This air is introduced through the bottom from a line carrying 100 p.s.i. air pressure, direct from the zinc plant operations, but is reduced to pressure desired for agitation.

Thickened material from the bowl is pumped by a 4-in. Wilfley pump back into the discharge spout from the first pair of cones. This is a way of re-mixing fractions of sand as the final product spreads out in open storage. Probably 12 percent of the wet plant feed material is overflowed to waste, of which about 85 percent is minus 325 - mesh material. Adjustments in the volume of water, on the lever arms controlling the discharge by weight from the first two cones and in the air agitation inside the 30-ft. bowl can be made to offset variations in the product as delivered from the dry plant.

Production in tons is influenced to

(Continued on page 60)



Two of the pumps handling discharges from second pair of settling cones back to feed box and then to first pair

Same Quarry— Different Rocks

Resistance of the Chicago area
dolomites to freezing and thawing¹

By H. B. WILLMAN²

THE AREA around Chicago, including Joliet and Kankakee, is the largest stone producing district in Illinois. In 1938, 3½ million tons of stone were produced in this area from dolomite deposits of Silurian age. The data available regarding the resistance to weathering of the various dolomite strata in the Chicago area are mostly fragmentary and not generally comparable. Also, there is need for information regarding what Chicago area rocks possess superior weather resistance to meet the requirements of special uses, such as filter stone for sewage disposal works.

In view of this situation an investigation has been carried out whose objectives were to determine the soundness of the Chicago area dolomites as measured by the freezing and thawing soundness test and the sodium sulphate soundness test, and to correlate the results of these tests with the lithologic character and the resistance of the stone to weathering in natural outcrops, and in structures in which the stone has been long exposed to the weather.

The study has been co-operative between three State agencies. The Illinois Geological Survey collected samples, studied their physical character, composition, and weather resistance in outcrops and structures. The Bureau of Materials of the State Division of Highways made freezing and thawing, apparent specific gravity, and absorption tests, while the Engineering Experiment Station of the University of Illinois made sodium sulphate soundness tests. The part of the investigation by the State Geological Survey was under the direction of Dr. M. M. Leighton, Chief, and J. E. Lamar, geologist and head of the Industrial Minerals Division;

the part by the Bureau of Materials was under the direction of V. L. Glover, engineer of materials, W. H. Schneider, and S. M. Peters; and the part by the Engineering Experiment Station was under the direction of Prof. E. E. Bauer.

[Because of space limitations, an abstract, not the author's own phraseology, is given in what follows.—The editor.]

Samples and Classification

Samples were taken which gave two vertical sequences across about 350 of the 450 ft. of dolomite formations (depth). The samples were classified into lithologic types, chiefly by visible characteristics which it was thought might affect weathering resistance, grain size, porosity and structure. The samples were divided into 15 types (Table 1).

Although all the samples were fine-grained (few grains as large as 0.5 mm.) they could be subdivided into three groups: fine, medium and coarse grained. Porosity visible to the naked eye, called "macroporosity," classified the samples as low, medium and high.

Certain conspicuous structural characteristics were also used in the separation of the types, some of these characteristics brought out by etching the surface with hydrochloric acid.

Editor's Note

THE VALUE to the industry of this paper is not so much in the study of a particular dolomite deposit. It is (1) an example of applied geology in determining the character of a quarry product; (2) proof that in the same deposit are many varieties of rock; (3) points out the advantage of selective quarrying for a product for a particular purpose; (4) shows the absurdity of selecting a few samples from quarry run to determine the character of the product. Had the product been tested from such haphazard sampling, it might have been condemned as unfit; whereas by selective quarrying and accurate sampling, a very superior product could be produced. The same applies to many quarries.

—The Editor.

In Fig. 1, the upper left picture shows a rock with low insoluble residue (type E), with even distribution of the very fine-grained residue, except for the local deposit of secondary silica. The upper right picture shows a rock (type A) with concentrations of quartz silt in short lenticular curved ridges. In the lower left the dark lines are clay laminae (type B). In the lower right, a rock with a variable texture (type C) has a large amount of insoluble residue in the lower part, and very little at the top. The silt grains stand in relief and are light colored.

Two types were differentiated because they contain an abundance of bitumen in the pores.

Chert may locally be found in any of the types but it is most abundant in types A, B, C, and E, and is relatively rare in the coarse-grained types. An attempt was made to exclude chert from all the samples as most of the chert in these formations is known to have low weather resistance.

TABLE 1. DISTINGUISHING CHARACTERISTICS OF THE TYPES

Type	Comparative grain size	Macro-porosity	Other Characteristics	Average % Insoluble Residue	Number of Samples
A	Fine	Low		13.1	48
B	Fine	Low	Clay laminae	24.7	12
C	Fine	Low	Variable texture	11.0	6
D	Fine	Medium		7.7	21
E	Medium	Low		4.1	15
F	Medium	Low	Variable texture	4.3	7
G	Medium	Low	Silicified	13.4	1
H	Medium	Medium		2.5	27
J	Coarse	Low		6.5	13
K	Coarse	Low	Pink, few clay laminae	9.0	8
L	Coarse	Medium		1.2	29
M	Coarse	Medium	Bituminous	.5	6
N	Coarse	High		1.3	12
O	Coarse	High	Bituminous	.9	8
P	Coarse	Medium and high	Some ¼-inch or larger cavities	.8	11

¹ Published by permission of the Chief, Illinois Geological Survey. Presented at the joint session of the 1940 Illinois Industrial Mineral Industries Conference and the Fall Meeting of the Industrial Minerals Division, American Institute of Mining and Metallurgical Engineers, Urbana, Ill., Nov. 15, 1940.

² Associate Geologist, Industrial Minerals Division, Illinois Geological Survey.

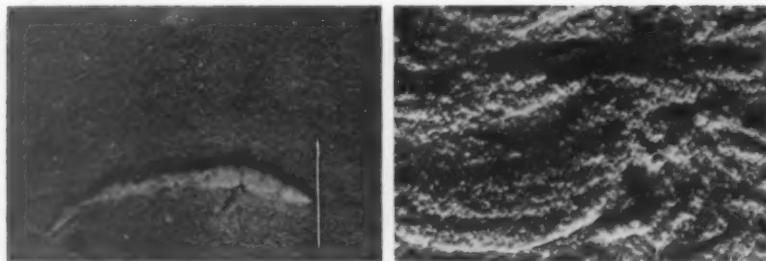
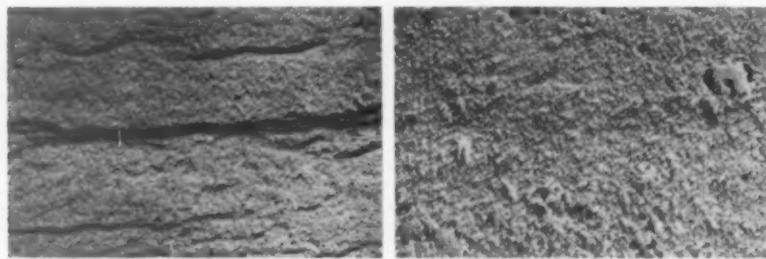


Fig. 1: Etched surfaces showing distribution of the insoluble residue. Above: Type E, left, 3 percent residue evenly distributed; type A, right, 12 percent residue in lenticular areas. Below: Type B, left, 21 percent residue in clay partings; Type C, right, 14 percent residue in irregular areas



Staining tests, microscopic and x-ray examinations proved the carbonate mineral in the rocks to be practically pure dolomite, with a little secondary calcite in the pores of some. The rocks differed therefore chiefly in the amount and character of the insoluble residues (in hydrochloric acid). Table 1 shows from these data that there is a rough correlation between physical properties and amount of insoluble residue. There is also a correlation between macroporosity and the amount of insoluble residue. Within each grain-size group, the rocks of low macroporosity contain more insoluble residue than those of medium and high porosity.

Freezing and Thawing Test Results

Details of the method of testing are given in the paper, which will be published in full by the Illinois Geological Survey. Failures are described in the terms slaking or crumbling, flaking, chipping, cracking and splitting (Fig. 2). From comparison of pictures of test specimens, a measure of failure was developed, the "breakage modulus" (Fig. 3), obtained by adding the breakage numbers of individual specimens and dividing by the number of specimens in the particular sample. The modulus thus varies from 0 to 4, after 200 cycles of freezing and thawing.

[From here on is the original text.
—The editor.]

Study of the test results shows that many of the failures may be attributed to the structure of the dolomite. Those types containing abundant clay partings fail early in the test, due to

breaking along the partings. The amount of breakage caused by clay partings depends on the spacing of the clay partings and the size of the test pieces. Samples with partings more than inch or two apart might show little breakage as in their preparation the test specimens would likely break along the partings and have a few partings inside. A commercial product of equivalent or smaller size might also show little breakage, but where the dolomite was used in large pieces breakage by freezing and thawing might be important.

The relation of the average breakage moduli of the types to certain physical properties is shown in Table 2. In general the amount of breakage decreases with increase in grain size, although there are a few exceptions. Types J and K show a greater failure than the other coarse-grained types

because they contain clay laminae.

The dolomites with low macroporosity generally have higher breakage than those with medium and high macroporosity. Type B which has medium macroporosity and fine grain size, shows the opposing effect of these two factors by having higher breakage than the other medium grained types and lower breakage than the other fine grained types.

Total porosity does not always correlate closely with the macroporosity nor with the breakage modulus. High water absorption is usually accompanied by low resistance to freezing and thawing, but there are many exceptions. However, the combination of high absorption and low macroporosity almost invariably results in a dolomite with a high breakage modulus.

Certain of the types were separated on characteristics which, so far as these tests show, do not have a significant effect on resistance to freezing and thawing. Types M and O, which were differentiated because they contained a conspicuous amount of bitumen in the pores, showed the same bitumen in the pores, showed the same slight breakage as similar types without bitumen (Types L and N). Also, the presence of large cavities (Type P) did not decrease the resistance of the dolomite to weathering.

The average amount of the insoluble residues in the types shows a good correlation with the breakage modulus, the amount of breakage decreasing with decrease in the amount of residue (Table 2). Exceptions may usually be explained by an irregular distribution of the insoluble materials in the dolomite. Type G dolomite with its high residue is the one sample of partly silicified dolomite. The presence of secondary quartz in part explains the low porosity, the lowest of all the samples studied, and the addi-

TABLE 2. RELATION OF THE BREAKAGE MODULUS TO OTHER PROPERTIES

Breakage modulus	Type	Grain size	Macro-porosity	Total porosity	Absorption by volume	Insoluble residue	Saturation coefficient	Number of samples
3.8	B	Fine	Low	9.2	7.7	24.7	.84	12
3.6	C	Fine	Low	8.7	6.7	11.0	.79	6
2.5	A	Fine	Low	7.7	5.8	13.1	.72	48
1.9	K	Coarse	Low	4.6	3.0	9.0	.64	8
1.6	D	Fine	Medium	9.8	5.9	7.7	.60	21
1.2	J	Coarse	Low	4.2	2.4	6.5	.58	13
1.1	F	Medium	Low	7.8	4.0	4.3	.52	7
1.0	E	Medium	Low	6.1	3.2	4.1	.52	15
.6	H	Medium	Medium	8.9	3.5	2.5	.39	27
.5	N	Coarse	High	12.4	4.6	1.3	.37	12
.4	M	Coarse	Medium	7.0	1.9	.5	.27	6
.4	P	Coarse	High	4.5	11.2	.8	.40	11
3	L	Coarse	Medium	7.6	2.5	1.2	.33	29
.2	O	Coarse	High	14.2	4.9	.9	.34	8
0	G	Medium	Low	2.8	1.1	13.4	.39	1

tional strength imparted by the connected veinlets of quartz is probably responsible for its low breakage.

The relation of the breakage modulus to the amount of insoluble residue for all the samples regardless of type is shown in Fig. 12 in which each sample is plotted according to its breakage modulus and the amount of residue; the vertical bars indicate the average breakage modulus for all the samples plotted within each horizontal bar. The average breakage moduli show a definite trend toward greater breakage with increasing amounts of residue. However, the individual samples within each group show a considerable range, or scattering, which might be expected because of the importance of other factors such as mineral composition and manner of distribution of the residue in controlling breakage. Nevertheless, the generalization may be made on the basis of these test data that Chicago area dolomite with less than 2 percent residue will not have a breakage modulus of over 1.0, that dolomite with less than 6 percent residue will not have a breakage modulus of over 2.0, and if the residue is over 10 percent, the breakage modulus is likely to be about 2.0 or over.

The breakage modulus shows a closer correlation with the average saturation coefficient of the types than does the amount of insoluble residue. The saturation coefficient, devised by Hirschwald,³ is the ratio of the water absorbed by volume in 24 hours to the total porosity of the rock. It is, therefore a measure of the degree of saturation which is easily obtained, and it is a rough measure of the saturation of the sample under the conditions of the freezing and thawing test. Those types

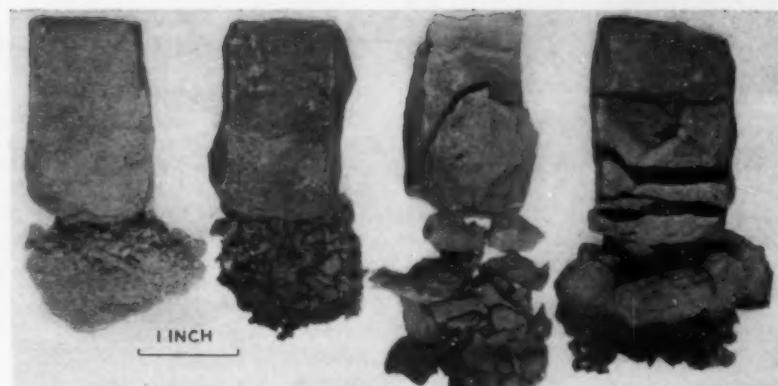


Fig. 2: Types of breakage. Left to right, sinking or crumbling, flaking, chipping, and cracking and splitting

(Table 2) with a saturation coefficient of less than 0.6 are in the range of low breakage; those with a saturation coefficient of 0.6 to 0.7 are in the range of medium breakage, and those with a higher saturation coefficient have high breakage.

The correlation between the breakage modulus and the saturation coefficient for all samples regardless of type is shown in Fig. 13. As water expands 10 percent on freezing, theoretically no failure should occur unless the rock has a saturation coefficient of 0.9, which is equivalent to 90 percent saturation. In practice, however, Hirschwald⁴ and others found that some rocks with a coefficient of 0.7 to 0.8 were unsound while others with a coefficient of over 0.8 were not affected. The present tests indicate there is no specific saturation coefficient above which the rock fails, and below which it is sound. Rather there is a fairly uniform gradation from low breakage with the low coefficients to high breakage with the high coefficients. Some variations

would naturally be expected because of variations in the amount of unconnected pore space, in permeability, and in structure. In some cases parts of the test specimens may reach a saturation of 90 percent or more while other parts have a lower saturation.

The results of the present tests show a much closer correlation between the saturation coefficient and the degree of breakage than previous investigations have indicated. This may be because all the rocks tested in the present study are closely related in chemical and mineral composition.

Considering the limitations of accuracy in the measurements of apparent and true specific gravity and water absorption, all of which are needed to calculate the saturation coefficient, the accuracy of the latter as determined in this investigation is probably in the order of ± 0.05 and in certain cases ± 0.1 . Nevertheless, the average of the coefficients of many samples is likely to be significant. These data correlate sufficiently closely to indicate that when the saturation coefficient is known the breakage modulus can be estimated with reasonable accuracy.

Geological Formations and Test Results

The resistance of the Chicago area dolomites by geological formations to 200 cycles of freezing and thawing is shown in Fig. 14. This is a composite section of the samples from several quarries plotted according to their thicknesses and breakage moduli. It shows the variable breakage

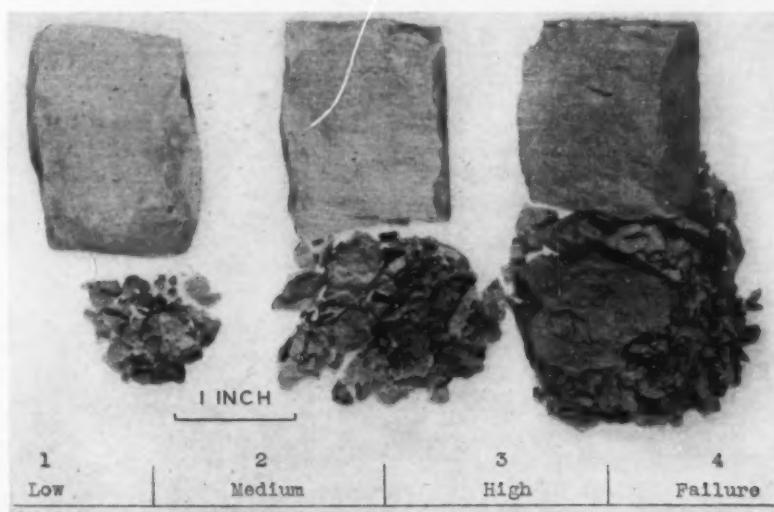


Fig. 3: Degree of breakage of specimens tested

³ Hirschwald, J., *Handbuch der bautechnischen Gesteinsprüfung*, Berlin, 1912, p. 199, et seq.

⁴ Hirschwald, J. op. cit.

⁵ Kreuger, H., *Ingenjörs Utenakapsa Akademien, Handlingar No. 24*, Stockholm, 1924.

⁶ Schaffer, R. J., *The weathering of natural building stones: Dept. of Scientific and Industrial Research, Building Research Special Report 18*, 1932, p. 49.

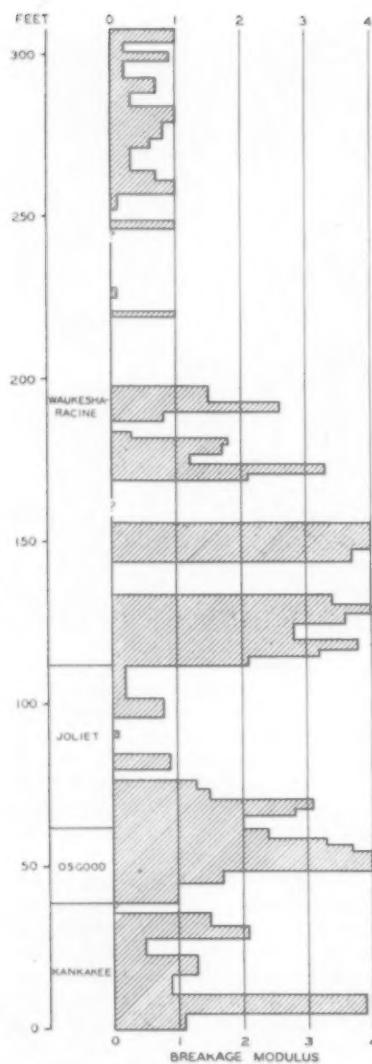


Fig. 14: Columnar section of the Chicago area dolomites showing vertical variation in the degree of breakage by the freezing and thawing test

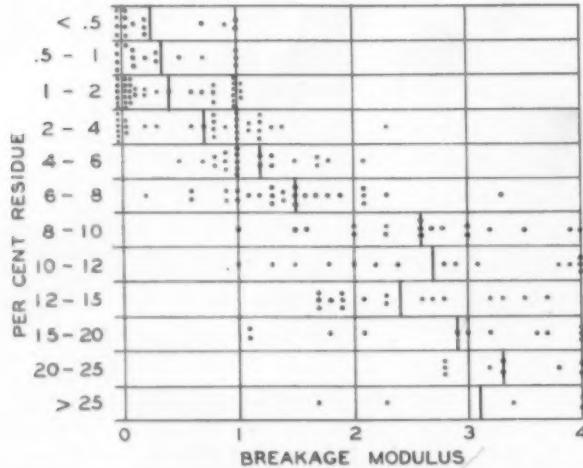


Fig. 12: Relation of the amount of insoluble residue to the breakage modulus

of the Kankakee formation, the comparatively high breakage of the Osgood formation and the lower part of the Joliet formation, an interval of low breakage in the upper Joliet, and a considerable thickness of high breakage dolomite in the lower part of the Waukesha-Racine formation. The low breakage dolomite in the upper part of the Waukesha-Racine formation is reef rock.

Although these data show that certain parts of the dolomite formations have considerable breakage when subjected to 200 cycles of freezing and thawing, this should not be interpreted to mean that such stone is unsuitable for many purposes. For example, in the use of stone for concrete aggregate, stone which withstands 100 cycles is usually considered satisfactory, and on this basis the dolomite samples as a whole showed good resistance to the freezing and thawing tests. The degree of breakage at 200 cycles is of value in the selection of stone for purposes where it is to be subjected to unusually severe conditions of freezing and thawing. The tests show that samples having very low breakage at 200 cycles also have little breakage at 790 cycles.

Summary

The following generalizations may be made regarding the resistance of the Chicago dolomites to freezing and thawing tests:

- It is possible on the basis of readily determinable textural and compositional features of the Chicago area dolomites to forecast with reasonable accuracy their resistance to freezing and thawing.

- The coarser-grained dolomites have higher resistance to freezing and thawing than the finer-grained rocks, except when clay partings are present.

- The dolomites with medium and high macroporosity have greater resistance to freezing and thawing than do those with low macroporosity.

- In general, the higher the amount of insoluble residue the lower the resistance to freezing and thawing, but some exceptions result from variations in the composition of the noncarbonate materials and their distribution. Dolomites containing clay partings especially have low resistance.

- In general, the higher the saturation coefficient the lower is the resistance to freezing and thawing.

- The dolomite in each of the geological formations of the Chicago area varies in resistance to freezing and thawing but each formation has certain general characteristics which appear to be typical.

Asphalt Conference Proceedings

THE ASPHALT INSTITUTE, New York, N. Y., has just announced that printed copies of the 1940 annual conference are now available. This 238-page book contains numerous illustrations and tabulations accompanying the addresses by prominent engineers. Specifications of bituminous mix roads, airport runways, and details as to requirements for aggregates are outlined in this report which should be of interest to anyone who plans to bid on government work.

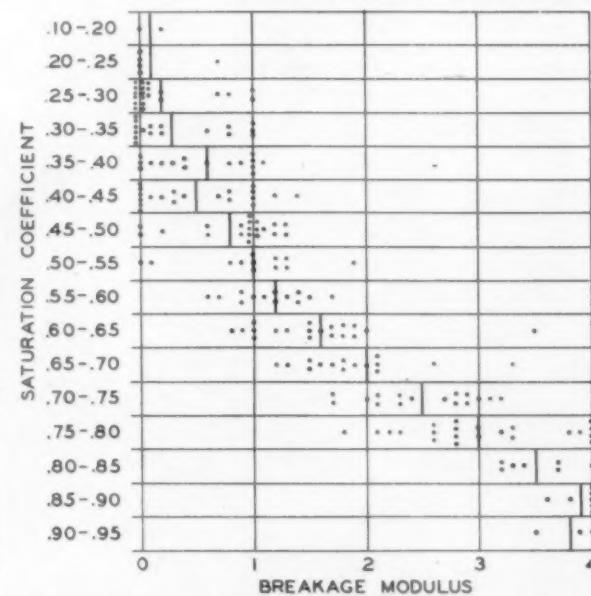


Fig. 13: Relation of the saturation coefficient to the breakage modulus

Revolutionary Type of Lime Kiln

Relatively small calcining units that operate in groups as a battery burn crushed limestone down to 1/4 inch

By T. R. ELLERBECK* and W. E. HEFFERNAN†

LARGE ACCUMULATIONS of minus 2-in. stone which is too small to burn satisfactorily in the usual shaft kiln have caused many lime producers to use rotary kilns. With the adoption of the rotary kiln, the developments in lime burning technique were split, and have been applied to the rotary kiln method as well as the older shaft kiln method. As yet the controversy as to whether the rotary kiln method is a more desirable way of burning lime than the shaft kiln, all things considered, has not been definitely settled.

Many worthwhile improvements have been made of late in both methods of lime burning, such as induced draft, center burners, recirculation of gases and submerged gas offtake as applied to shaft kilns, and preheaters and heat recuperators as applied to rotary kilns. These recent improvements have greatly in-

creased the operating efficiency as well as the capacities of both rotary and shaft kilns; but just how sure can we be that either method is the most desirable way of burning lime? In other words, if the lime industry were just starting and for the first time the problem was faced of burning limestone into lime wouldn't it be interesting to see what method and equipment would be used to accomplish the calcination? Under these conditions there is reasonable doubt that the lime industry would develop the same type of calcining equipment that we have today. With this in mind it was decided several years ago more or less to back away from all present methods of calcining limestone and start from scratch on the design of a calcining unit.

Basic Conditions to Be Met

There were several basic conditions which it was felt should be met which were as follows:

First, the unit should be designed to burn crushed limestone of from $\frac{1}{4}$ in. up to approximately 2 in. in size rather than lump material. This is essential because the crushed product, especially in a small operation, can be produced cheaper than the larger hand-sized stone; also, the fines, which must be disposed of, are not as large a proportion of the mined stone and consequently not as serious a problem as when the larger stone is used. Furthermore, mechanical handling of the feed and discharge is greatly simplified with the use of crushed material. The time of calcination is also greatly lessened when treating the smaller-sized stone.

Second, the unit should be automatic and of continuous operating design; that is, there should be automatic and continuous raw feed and automatic and continuous discharge of the finished material, which conditions naturally cause

Fig. 2: The other side of the calciner, showing combustion chamber, variable speed discharge drive mechanism and, lower right, the automatic control unit. Note two thermocouples in the combustion chamber and draft gauge pipes in hood and combustion chamber

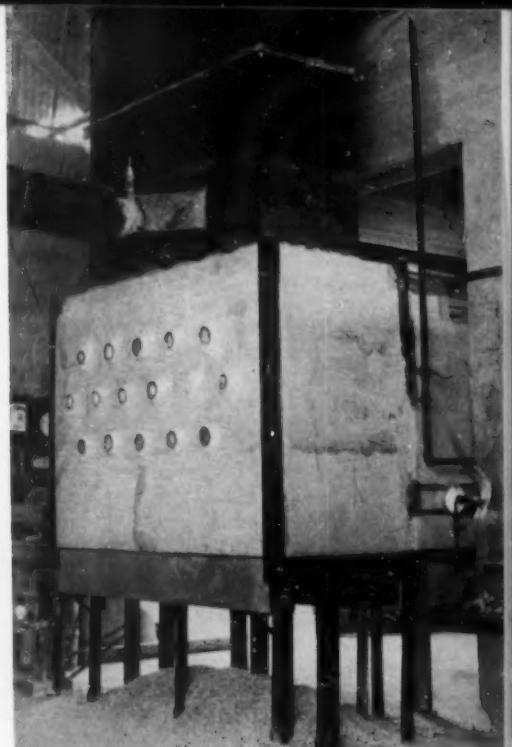
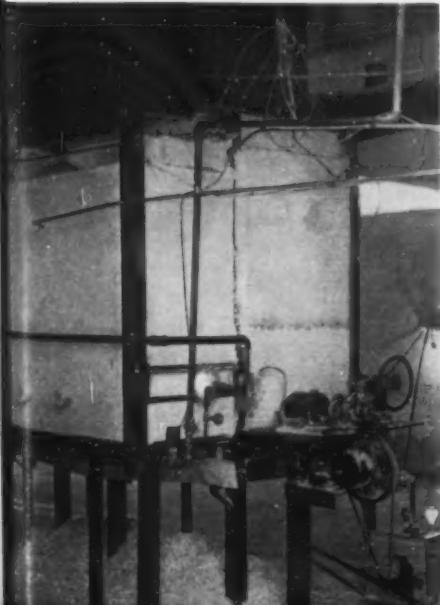


Fig. 1: One side and end of the complete "Ellerman" calciner in operation. Note the thermocouple where exhaust gas temperatures are taken and the calcined material under the unit. A belt conveyor is to be installed to take the calcined material away. The circles on the side of the calciner are sealed pyrex glass observation ports through which the flow of material throughout the calcining zone may, at all times, be watched. Total height, from floor to top of feed hopper is 14 ft.

continuous flow of material through the unit. This is desirable because, with continuous flow of material, balanced conditions of draft, temperature and heat transfer can be arrived at and maintained, whereas, with intermittent charging of the raw feed and intermittent drawing or discharging of the finished product, it is impossible to maintain a balanced condition. Without maintaining a balanced condition, a uniformly calcined product cannot be secured, and uniform calcination is a prerequisite of uniform quality. Automatic charging and discharging also reduces operating labor which is an essential consideration in designing any plant.

Third, the unit should be designed so as to give an efficient heat balance. This calls for reducing the heat wasted to a minimum. In order to waste as little heat as possible it is essential that the temperature of the exhaust gases be held down close to a minimum (and in calcining lime there is a definite minimum un-

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†Lime Burning Superintendent, Utah Copper Co., Bingham, Utah.

diluted exhaust gas temperature below which it is impossible to go); the temperature of the lime drawn should be low; the radiated heat lost should be kept at a minimum which calls for reduction of the area of hot kiln surfaces to a minimum and insulation of these surfaces. Also, in order to conserve heat, air leakage into the unit should be eliminated and if possible without the use of expensive and troublesome air seals. It is obvious that fuel combustion must also be efficient.

Fourth, the unit should be so designed that the temperature of the combustion gases entering the kiln can be varied at will so that the most desirable calcining temperature for a certain limestone can be determined and then maintained. This has an important bearing on the quality of the lime produced.

Fifth, the calcining unit should be of small capacity, inexpensive as regards cost per ton of daily capacity, and each unit should be independent and self contained. This fifth point is in some respects a radical departure from present practice and probably the reasons behind this point should be rather fully explained.

Smaller Instead of Larger Kilns

The trend in the lime industry the last twenty years or so has been to build bigger and bigger kilns with

higher and higher daily capacities. This has gone on until now there are shaft kilns producing over 80 tons per day and rotary kilns producing over 150 tons per day. This is all well and good as long as steady business, which takes these large outputs, is available; but this is not so good if business conditions happen to be such as to make it necessary or desirable to operate one of these kilns at, say 20 percent of capacity. Then the efficiency is apt to decline seriously, causing production costs to further mount at a time when it hurts the most. As a result of the development of large capacity kilns, many lime plants are dependent upon one or two large kilns for their entire production. This leads to the undesirable condition that when kiln repairs are necessary one-half or the entire plant output is stopped during the time the kiln is shut down for these repairs.

In direct contrast to this dependence on single large units in lime burning is the practice followed in the milling and concentration of ores. In milling ore the practice is to use relatively small efficient units such as ball mills, classifiers, flotation cells, etc., of relatively low individual capacities. Then the completed mill of any desired total capacity is made up of a multiplicity of the smaller units. As an example, there are oper-

ating adjacent to Salt Lake City, two copper concentrating mills having a combined capacity of over 80,000 tons of ore per day. In going through these mills you do not see enormous, especially designed machines; instead you find standardized crushers, standard-sized ball mills, rolls, flotation cells, etc. Dozens of ball mills, yes, and hundreds of flotation cells; but each one operating at its maximum efficiency. Through this use of a multiplicity of units metallurgical efficiency and plant capacities go on uninterrupted, year in and year out, in a way that would be impossible if their operations were dependent upon a very few machines of enormous capacities. It was for these reasons that it was decided the calciner should be a small inexpensive self-contained unit, and that final plant capacity be governed by the number of units installed, and reduction in output be effected by operating fewer units.

Without going into detail as to why the final design was decided upon it is sufficient to say that, after the unit was designed on paper, a laboratory unit was constructed and test data taken on this test unit for approximately a year. On the basis of the data obtained a full-sized unit was constructed and operated intermittently for about two years. At the end of that time all difficulties

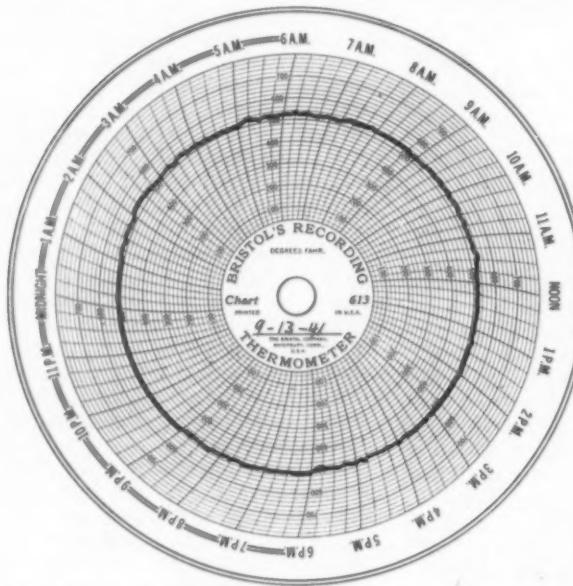
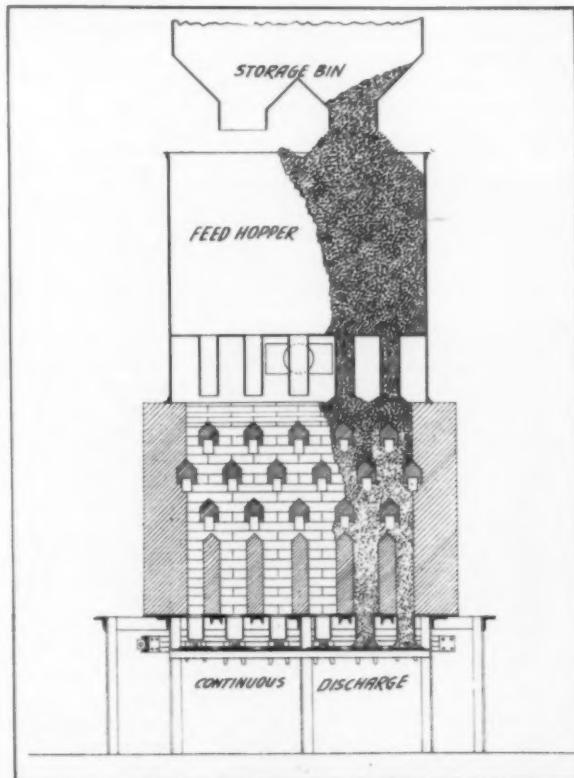


Fig. 3, above: Twenty-four hour chart recording temperature of exhaust gases

Fig. 4, right: Vertical section of the "Ellernan" calcining unit showing the general design and flow of material



which appeared from time to time had been eliminated and the unit was put into steady production, and has been in operation as a producing unit for about six months.

Realizing that the finer sizes of rock would present the greatest difficulty as regards heat penetration and draft requirements, both the laboratory unit and the present production unit were designed to take a rock feed which was plus 3/16 in. and minus 5/8 in. in size. If this size material could be handled successfully it would be a simple matter to then design units for coarser material. The operating characteristics of the producing unit are as here listed:

Rock size	Plus 3/16 in., Minus 5/8 in.
Draft	1.7 in. of water
Temperature of calcining gases	2350 deg. F.
Temperature of exhaust gas	520 deg. F.
Temperature of discharged lime	135 deg. F.
Firing method	2 oil burners
Discharge	Continuous
Mechanical air seals	None
Exterior heat radiating surface (insulated)	120 sq. ft.
Total height of brick work	5 ft.
Overall height of calciner from floor to top of feed hopper	14 ft.
Outside calciner dimensions	7 ft. x 4 ft. 6 in.
Lime output per sq. ft. of inside area per day	2,000 lb.
Total weight of calciner complete with support and feed hopper	10 tons
Weight per ton of daily capacity	445 lb.
Time of travel through both preheat and calcine zone	1 hr. 20 min.

New Kiln Described

Some of these characteristics are rather startling when compared with results secured in standard practice and from a study of them it can be seen that the unit in every way meets the basic considerations as set forth earlier in this article. At the present time even though flame tempering air is not being preheated the fuel consumption per ton of lime is 6,200,-000 B.t.u. (3100 B.t.u. per lb. of lime). This is a fairly respectable figure, especially as compared to standard rotary kiln practice, and it is anticipated that this heat requirement will be considerably reduced when provision is made to preheat the secondary and tempering air. The present unit is being fired with oil but other types of fuel may be used, such as gas or coal, stoker fired.

From the photographs and cross-sectional sketch it can be seen that the unit is of an entirely new design and radically different from any present lime kiln. It is very compact and acts as a preheater, calciner, and cooler simultaneously.

Also, there are no mechanical air seals at any point in the system. Any tendency for infiltration of air at the open top is taken care of by having a sufficient and fixed height of rock in the charging hopper, which re-

mains constant and is independent of any change in quantity of material in the storage bin. This fixed level hopper is of sufficient height as compared to the height of the calcining zone that air leakage is practically eliminated. At the bottom of the kiln, which is open to the atmosphere, the air seal is effected through a considerable height of burned lime in the cooling section. This is also of sufficient height as to allow only enough air to filter up through the lime to cool it to the desired temperature.

The use of transverse beams in the body of the kiln gives an intermixing or stirring action between rock and

or rotary kilns. This has been definitely determined, since the identical blend of rock from the same quarry is being burned at the present time in two rotary kilns of 6 ft. and 8 ft. in diameter and 125 ft. long, and also in three 8 ft. inside diameter shaft kilns, and comparative tests of lime from each type of calciner are constantly made.

Kiln Operation

The general operation of the calciner is given in the following brief description of the flow of gases and material which may be more easily understood by a study of Figs. 1, 2 and 4.

The combustion chamber shown in Fig. 2 is outside the calciner proper and is fired with two oil burners, one located at each end. In the combustion chamber the gases are tempered to the desired degree by efficient intermixing with either pre-heated air or recirculated exhaust gases. The tempered gases enter into the calcining chamber proper through many relatively small openings in the side wall between the combustion chamber and the calcining chamber.

These openings are just below the ends of the transverse beams which span the width of the calcining chamber and are shown in section in Fig. 4. The gases pass into the mass of stone through the exposed stone surfaces under the beams; they then pass up through the mass of stone, which is slowly but constantly moving down. The hot gases are normally admitted under the beams in the two top layers. Under the beams in the third layer, additional hot gases may be admitted for calcining if needed or if desired, the flow of gases at these points may be reversed and cooling air which has come in at the discharge feeder and up through the calcined lime may be drawn from under these beams into the combustion chamber and used as tempering air. The gases in passing up through the mass of stone calcine and then pre-heat and are finally discharged from the surface of the stone into the hood chamber which is located around the feed spouts between the top of the brick work and the bottom of the feed hopper. From the hood chamber the gases are withdrawn from a central point through a pipe by means of an exhaust fan. (See Fig. 1.)

The counterflow of rock down through the calciner is controlled by the multi-variable discharge mechanism at the bottom of the cooling section and by this means the flow of

(Continued on page 60)

Determining the Surface Area By Air Permeability Method

SOME OUTSTANDING ADVANTAGES are to be found in the Lea and Nurse⁵ air permeability method of determination of fineness of powders, as modified by Blaine³, which should lead to its universal use in laboratories for the determination of surface areas of cement and ground raw materials.

The method is rapid, only the readings made at one position are necessary. No particle size weight distribution curve is necessary as with most surface area methods of determination. The method is almost "fool-proof" and reproducible results can be obtained by non-technical workers after a few minutes' instruction. The apparatus, manufactured E. E. Bowen & Co., is rugged, with little liability to breakage, and no supplies are used up in operation.

Comparison of Air and Wagner Methods for Surface Area Results

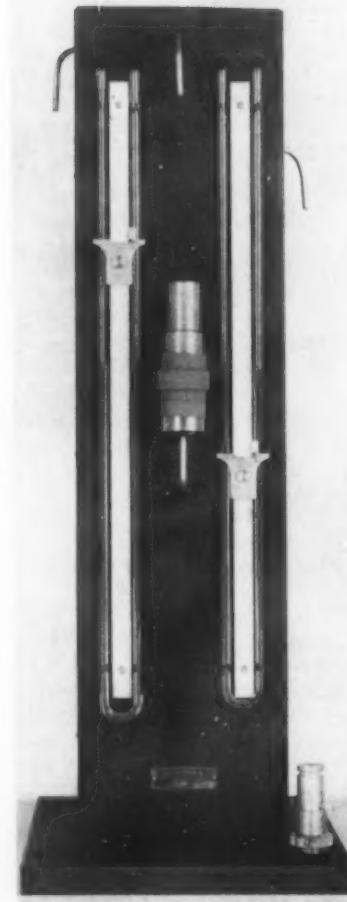
Surface area results by the air permeability method are considerably higher than by the Wagner Turbidimeter method.

It appears impossible to make an exact surface area determination, even with the microscope, because of bi-dimensional measurements and the irregularities of the surface of particles. There is some evidence that the surface area of powders more nearly approaches Lea and Nurse results than Wagner's. However, from a practical viewpoint it is not necessary to know the exact surface area, but only to know the

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CHEMIST'S CORNER

Problems and practices of the chemists in the industry are discussed on these pages. Contributions and comments are invited.



Fineness meter for making permeability test

direct comparative surface area of different samples.

If one wishes to use the air-permeability method and still retain Wag-

ner units, it is only necessary to find the ratio of surface area results between the two methods and change the air-permeability results by a factor. For routine work on samples with approximately the same specific gravity, a chart can be made with H_1/H_2 in one column and surface area results reduced to equivalent Wagner figures in the other column.

A batch of preliminated clinker plus gypsum was ground in a laboratory ball-mill, and samples taken at different intervals were run by both Wagner and air-permeability methods with the following results:

Grinding time	Surface Area Air-permeability	Ratio Air-perm. S.A.	
		Wagner	Wagner S.A.
start.....	642	363	1.77
15 min.....	1593	880	1.81
30 min.....	2097	1179	1.78
45 min.....	2494	1440	1.73
1 hr. 00 min.....	2827	1665	1.70
1 hr. 15 min.....	3143	1825	1.72
1 hr. 30 min.....	3396	1991	1.71
1 hr. 45 min.....	3622	2084	1.74
2 hr. 00 min.....	3756	2180	1.72
2 hr. 15 min.....	3946	2300	1.72
2 hr. 30 min.....	4188	2387	1.75
2 hr. 45 min.....	4269	2367	1.80
Average 1.746			

There appears to be no definite trend in changes of ratio influenced by degree of fineness, in the above.

The age of the clinker sample, probably modified by storage condi-

Description of Sample	TABLE A.			Corrected Vol. of gas Air-Perm. Ratio evolved S.A. after to at 350°F. heating Wagner per 100 gr. cement to red heat on original		
	Air- Perm.	Wagner	Ratio	30 c.c.	3215	1.75
Cement ground from old modified clinker	3160	1835	1.89	30 c.c.	3215	1.75
Cement ground from old modified clinker that had been heated red-hot	3252	1750	1.86	22 c.c.		
Cement ground from fresh modified clinker	3010	1730	1.74	16 c.c.		
Cement ground from old normal clinker	3342	1680	1.99	34 c.c.	3079	1.83
Cement ground from fresh normal clinker	3101	1690	1.83	14 c.c.		

tions, has a great effect on the ratio between air-permeability and Wagner results, as Table A indicates:

The cements (Table A) were ground in a laboratory ball mill at a low temperature where conditions are favorable to adsorption of air while grinding, but this behavior also occurs in large grinding mills to such an extent that at times when grinding old clinker it might be desirable to heat samples to red heat before testing by the air-permeability method.

Principle, Calculation and Method of Operation

Fig. 1 is a diagrammatic sketch showing the principle of operation. The sample of powder to be tested is compressed to a constant volume in the permeability cell, a reasonable suction pull is applied at H_3 . H_1 measures the pressure drop (or resistance to flow as compared to H_2) through the bed of powder. H_2 measures the pressure drop through the capillaries. $H_1 + H_2 = H_3$ the total pressure drop; that is, the difference between atmospheric pressure and suction line pressure.

Since the capillary resistance is a constant under constant conditions and the surface area of the powder in the permeability cell determines the resistance here for a given set of conditions, any change of surface here causes a change in the ratio H_1/H_2 , the variables which enter the calculation of the surface area of the powder.

A form of the formula for calculating results is:

$$\text{Surface area} = \sqrt{\frac{H_1/H_2 \times \text{density (1-porosity)}}{\text{capillary constant} \times \text{depth of bed}}}$$

If the last two factors of the above equal C, then, surface area equals

$$C \sqrt{H_1/H_2}$$

In the accompanying chart, values of C are given for different specific gravities and weights of samples. The method of operation given by Bowen is as follows:

- (1) Place filter paper in permeability cell.
- (2) Weigh out required amount of powder.
- (3) Place powder in permeability cell.
- (4) Tap the sides of cell to level the powder.
- (5) Insert the plunger into the permeability cell and compress the powder very

slowly and smoothly. Push the plunger straight down without any rotary motion until the collar is in contact with the top of the cell. (If powder comes up out of vent hole, it indicates that the plunger was inserted too fast or not smoothly enough.)

(6) Turn the plunger one complete revolution keeping the collar in contact with the top of the cell.

(7) Withdraw plunger slowly and with rotary motion. (Care must be taken not to jar permeability cell after the bed is prepared.)

(8) Remove any powder adhering to the plunger or any which was forced into

the vent and return this powder to the permeability cell.

(9). Repeat (5).

(10) Repeat (6).

(11) Repeat (7).

(12) Place permeability cell in place on the apparatus using the rubber sleeve over the joint. A thin layer of vaseline or grease in the joint between the cell and apparatus helps make an air-tight seal. (Care must be taken not to scratch or in any other way injure the surface of the bottom of the permeability cell such that it will not make a good seal.)

(13) After equilibrium has been reached (about 3 to 5 minutes) read and record heights of kerosene in manometers.

A modification of the procedure used at this laboratory is to use a second filter paper, of exactly the same

SPECIFIC GRAVITY	VALUES OF C FOR DIFFERENT WEIGHTS AND SPECIFIC GRAVITIES SAMPLE WEIGHT IN GRAMS																Capillary Corrections Sample Weight in Grams						
	10	10 1/2	11	11 1/2	12	12 1/2	13	13 1/2	14	14 1/2	15	15 1/2	16	16 1/2	17	11	12	13	14	15	16	17	
2.60	7074	6388	5771	5213	4706	4247	3829	3446	3093							14.8	12.3	9.8					
2.62	7130	6443	5825	5266	4758	4298	3879	3495	3142							14.9	12.4	9.9					
2.64	7186	6498	5879	5318	4810	4349	3929	3544	3191							15.1	12.6	10.1					
2.65	7214	6525	5906	5345	4838	4374	3953	3568	3216							15.2	12.6	10.1					
2.66		6552	5932	5371	4861	4399	3977	3592	3239							15.3	12.7	10.2					
2.68		6605	5984	5422	4912	4448	4026	3639	3285							15.5	12.9	10.4					
2.70		6658	6036	5474	4963	4498	4075	3687	3332							15.6	13.0	10.5					
2.72		6087	5525	5012	4547	4122	3733	3376								15.7	13.1	10.6					
2.74		6137	5575	5060	4595	4189	3779	3422								15.9	13.2	10.7					
2.75		6162	5600	5086	4620	4193	3802	3445	3117	2814						15.9	13.2	10.7					
2.76		6187	5624	5109	4643	4216	3825	3467	3138	2835						16.0	13.3	10.8					
2.78		6236	5673	5157	4690	4262	3870	3511	3181	2877						16.1	13.4	10.9					
2.80		6285	5721	5205	4736	4308	3914	3555	3224	2919						16.2	13.5	11.0	9.2	7.4			
2.82		6334	5768	5251	4782	4352	3958	3598	3266	2960						16.3	13.6	11.1	9.3	7.5			
2.84		6382	5815	5297	4827	4396	4002	3641	3308	3001						16.4	13.7	11.2	9.4	7.6			
2.85		6407	5839	5320	4850	4419	4025	3662	3329	3022						16.4	13.7	11.2	9.5	7.6			
2.86		6430	5862	5343	4872	4451	4047	3688	3350	3042						16.5	13.8	11.3	9.6	7.7			
2.88		6476	5908	5389	4916	4485	4090	3725	3392	3083						16.6	13.9	11.5	9.7	7.9			
2.90		6523	5953	5434	4961	4528	4132	3768	3433	3124	2839					16.7	14.1	11.6	9.8	8.0			
2.92			5478	5004	4571	4174	3809	3473	3163	2878						14.2	11.7	9.9	8.1				
2.94			5522	5047	4613	4215	3851	3513	3202	2916						14.3	11.8	10.0	8.2				
2.95			5544	5069	4634	4236	3870	3533	3222	2935	2670					14.3	11.8	10.0	8.3				
2.96			5565	5090	4655	4256	3890	3553	3241	2954	2698					14.4	11.9	10.1	8.4				
2.98			5607	5132	4696	4297	3930	3592	3279	2991	2734					14.5	12.0	10.2	8.5				
3.00			5650	5173	4737	4338	3970	3631	3316	3029	2761					14.6	12.1	10.3	8.6	7.0			
3.02			5691	5214	4778	4377	4009	3669	3354	3066	2797					12.2	10.4	8.7	7.1				
3.04			5732	5254	4818	4416	4047	3707	3391	3103	2833					12.3	10.6	8.7	7.2				
3.05			5753	5275	4838	4436	4066	3728	3410	3121	2851					12.3	10.6	8.7	7.2				
3.06			5774	5296	4859	4456	4085	3745	3429	3139	2870					12.4	10.7	8.8	7.3				
3.08			5815	5336	4898	4494	4123	3782	3466	3175	2905					12.5	10.8	8.9	7.4				
3.10			5855	5376	4937	4532	4162	3819	3504	3211	2940					12.7	10.9	9.0	7.5	6.1			
3.11					4955	4552	4181	3838	3523	3229	2957	2706	2471			12.8	11.0	9.0	7.6	6.2			
3.12					4974	4571	4200	3857	3541	3247	2974	2723	2488			12.8	11.0	9.0	7.6	6.2			
3.13					4992	4589	4218	3875	3559	3264	2981	2740	2505			12.9	11.1	9.1	7.7	6.3			
3.14					5011	4608	4236	3893	3577	3282	3009	2757	2522			12.9	11.1	9.1	7.7	6.3			
3.15					5030	4626	4254	3910	3594	3299	3026	2774	2538			13.0	11.1	9.2	7.8	6.4			
3.16					5049	4645	4272	3928	3612	3317	3043	2791	2555			13.0	11.1	9.2	7.8	6.4			
3.17					5068	4664	4290	3946	3629	3334	3060	2807	2571			13.1	11.2	9.3	7.9	6.5			
3.18					5088	4683	4308	3964	3647	3351	3077	2824	2588			13.1	11.2	9.3	7.9	6.5			
3.19					5107	4702	4326	3982	3664	3367	3093	2840	2604			13.2	11.3	9.4	8.0	6.6			
3.20					5126	4720	4344	4000	3681	3384	3110	2857	2621			13.3	11.4	9.5	8.1	6.7			
3.21					5145	4738	4362	4018	3698	3401	3127	2873	2637			13.3	11.4	9.5	8.1	6.7			

Note:—Values of C in table are based on capillary constant of 1.93×10^{-6} . For different Fineness Meters this varies from 1.93×10^{-6} to 2.00×10^{-6} .

For each 0.01 above 1.93 subtract amount given in correction chart above; for each 0.01 below 1.93 add amount given.

diameter as the inside of the permeability cell, on the top of sample of powder. Both filter papers should be very porous and correction for reduction of volume caused by second paper made by inserting a rim gasket of the same thickness of filter on top of bottom filter. Both filters may be used for some time if blown off by compressed air after each use.)

A mechanical device, Fig. 2, is used to insert plunger and compress sample at a uniform rate. The second, or top, filter paper prevents powder from going into the air vent or ad-

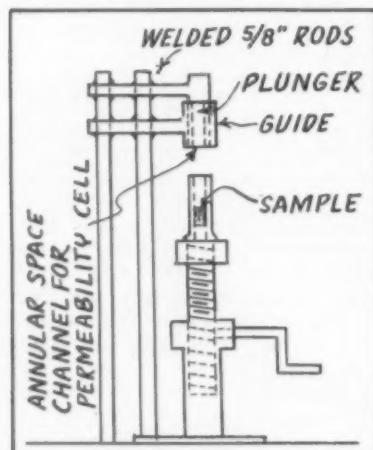


Fig. 2: Method of compressing sample to constant volume

hering to the sides of the cell; this eliminates the necessity of operations 8, 9, 10, and 11.

Effect of Temperature Changes On Results

A sample of cement was tested, starting in a cold room, raising the temperature and making tests at each successive 5 deg. F. rise of air temperature. The average of three such repeat tests was as follows:

Temperature, deg. F.	Surface area
65	2954
70	2930
75	2905
80	2881
85	2856
90	2831
95	2807

Each one degree F. rise of temperature causes a loss of approximately 5 sq. cm. per gram in the results. Similar results were also obtained on coarse and fine samples and their mixtures, which were run at two temperatures, a high and a low. The above indicates that for accurate results the temperature of testing should be constant, or a correction applied to results.

Different air pressures were applied to the same sample of cement

while it was in place in permeability cell, using low-humidity air so the sample would remain unchanged during the test, controlling the suction pull and keeping temperature constant, with the following results:

Barometric pressure	Surface area
26.1 in. mercury	2890
27.4 in. mercury	2904
28.7 in. mercury	2926
29.9 in. mercury	2948

Local changes of barometric pressure probably would not be great enough to cause errors of any magnitude but in a comparison of test results made at different altitudes this should be taken into consideration.

Effects of Humidity Changes

This was looked for by changing to moisture-saturated air above the cement sample in permeability cell, when running some samples with air of low relative humidity, but in no case was there any perceptible change in the manometer readings.

Effect of the Kind of Gas Used

Air apparatus was assembled to deliver different gases to the inlet of permeability cell without fluctuations of pressure or dilution of gas with air. The following results were obtained, using the same sample:

Kind of gas	Surface area
Air	2949
Oxygen	2947
Hydrogen	2687
Natural gas	3020

Lea and Nurse⁵ state that surface area values were unchanged when different gases were used instead of

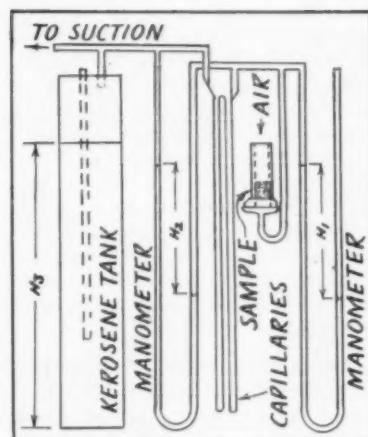


Fig. 1: Showing arrangement of permeability apparatus

air. The above results only agree with this statement in the case of oxygen, while hydrogen and natural gas give quite different surface areas.

Effect of Air Exposure of Cement, During Storage, On Surface Area

It is a common belief among cement testers that air exposure lowers the surface area of cement; this is sometimes explained by absorption of moisture causing the extreme fine particles to agglomerate.

A sample of cement was divided into three parts, one part spread out exposed to dry air of R.H. about 30, one part exposed to moist air of about R.H. 90, and the third part saved in an air-tight container. The original sample had a specific gravity of 3.20 and surface area of 3079.

In the above series of tests it was far more difficult to obtain repro-

MIXTURES OF POWDERS WITH DIFFERENT SIZED PARTICLES

Sample and Amount	Sp. gravity	Sample Wt.	Surface area	Calculated Surface area
100% Cement containing plastic agents	3.11	14.5 gr.	4620	
100% ground Limestone	2.70	14.0 gr.	7526	
Masonry Cement—50% of each above	2.905	14.0 gr.	6047	6073
100% Clinker particle size 20-50 microns	3.17	15.0 gr.	1140	
100% finely ground Gypsum	2.38	11.5 gr.	8030	
3.4% Gypsum in clinker mixed by shaking	3.144	15.0 gr.	1303	1366
3.4% Gypsum in clinker: gypsum sieved through 325 sieve onto clinker while being shaken	3.144	15.0 gr.	1365	1366
100% 100-200 mesh Clinker	3.23	15.0 gr.	385	
100% 20-50 micron Clinker	3.17	15.0 gr.	1140	
100% 0-15 micron Clinker	3.14	13.0 gr.	6650	
100% Clay	2.60	10.5 gr.	13250	
Mix of (51.02% 100-200; 30.61% 20-50 microns; 18.37% 0-15 micron clinker)	3.195	18.5 gr.	1760	1770
Mix of above containing 9.6% Clay	3.136	17.0 gr.	2777	2867

In the case of gypsum mixed with clinker, by shaking complete homogeneity could not be attained; flocs of gypsum were visible to the eye. These lowered the results by forming masses with an internal surface that did not affect the results proportional to their actual surface.

The gypsum mixed in from a 325 mesh sieve produced a homogenous mixture with a higher surface area result.

Age and Storage Conditions	Specific Gravity	Sample Wt.	$\sqrt{H_1/H_2}$	C	Surface Area
Dry Air					
4 hours	.3.198	15 gr.	.8332	3678	3064
10 hours	.3.195	15 gr.	.8220	3673	3019
29 hours	.3.19	15 gr.	.8205	3664	3006
52 hours	.3.18	15 gr.	.8202	3647	2991
6 days dry air	.3.16	15 gr.	.8172	3612	2952
Moist Air					
4 hours	.3.18	14.5 gr.	.7553	3964	2994
10 hours	.3.16	14.0 gr.	.7000	4272	2994
29 hours	.3.14	14.0 gr.	.7226	4236	3061
52 hours	.3.12	13.5 gr.	.6766	4571	3093
6 days moist air	.3.08	12.5 gr.	.5790	5336	3089

ducible results on specific gravity than on surface area.

Discussion of Results

It might not be absurd to reason that a powder could have such a grading of particle sizes that each successive smaller size would fill the gaps in the larger sizes. The diameter of the resulting voids in the powder would be smaller than in another powder with the same surface area but a grading that would not allow easy packing, and the first powder with voids of small cross section should show a greater resistance and an excessive high surface area. (It is even conceivable that the openings in a cross section might approach microscopic size.)

That the above condition does not occur (except possibly by the use of enormous compressive forces to compact the powder) is indicated by the fact that there is no trend for mixtures of different particle sizes to show higher surface areas than those calculated from the different sizes used in the mixture.

In a mixture of different sized aggregates or particles, random or chance packing prevails to a great extent; even in well-graded concrete aggregate it is difficult to get the voids down below 27 percent.

In a mass of spheres of the same size, arranged in cubical piling, the voids are about 48 percent. The same spheres in hexagonal arrangement are only about 26 percent, yet the chance packing of the spheres by pouring them into a container, will not have less than 44 percent voids.

As particle sizes become increasingly smaller another factor enters; surface forces, compared to the weight of the particles, become increasingly greater. Gravitational pull relative to adhesive forces becomes smaller and particles at point of contact tend to be held together and to hold random configuration.

Gibbs¹ says: "When crystalline particles, free from adsorbed gas, come into contact, they will tend to form aggregates possessing a definite

crystalline form. Amorphous particles similarly, will produce aggregates of no definite form.

Particles that are surrounded by a layer of adsorbed gas *** will still be able to attract one another, but will be unable to coalesce, unless the force with which they attract one another is sufficiently great to displace the gas film at the point of contact. Such particles will form fluffy aggregates."

In mixtures of different sized particles the finest particles tend to agglomerate among themselves and to coat larger particles somewhat as in Fig. 3.



Fig. 3: Arrangement of particles

The behavior of small particles, as in Fig. 3, and the presence of an adsorbed envelope of air or other gas, is why the weight per unit of volume decreases and pore space increases with fineness of materials.

Viscosity of the air or gas used is probably not a factor in changing the ratio of H_1/H_2 and resulting surface area depending on this ratio, because:

A change in resistance in either the sample or the capillaries, caused by a change in viscosity of gas, would be proportional to value of each resistance existing before the change and therefore H_1/H_2 ratio would remain constant.

The effect of temperature and pressure changes on surface area results, harmonizes with what to expect from the known behavior of adsorbed gas films on powders.

Quality of adsorption—thickness of

CONDITIONS

CONDITIONS	VISCOSITY OF GASES	SURFACE AREA
Increase of pressure	No Change	Increases
Increase of temperature	Increases	Decreases
Increase of humidity	Decrease	No Change
Air (as a standard)	1724 No. X 10 ⁷	2949
Oxygen	1920 No. X 10 ⁷	2947
Hydrogen	850 No. X 10 ⁷	2687
Natural gas	1050 No. X 10 ⁷	3020

adsorbed shell—is proportional to pressure. This would raise the surface area due to decrease of cross section, or effective diameter, of capillary channels in the powder.

Also, adsorption is inversely proportional to temperature. A rise in temperature would increase the effective diameter of the pore spaces and decrease the apparent surface area.

Carman⁴ used liquids as the permeating fluid. For very fine powders the thick shell of liquid at the surface of the powders gave high surface area figures. Because of this, Lea and Nurse⁵ substituted the use of air in the permeability method.

In the series of samples exposed to dry and moist air, the rise of surface area in the moist air exposed samples could be due to a shell of water displacing a thinner shell of air.

It might be objected that adsorption in the glass capillaries of the instrument would counter-affect adsorption in the sample, but this could be so to only a very small extent, as the surface exposed to adsorption in the glass capillaries is very small compared to the powder surface exposed.

Summary

Surface area results with the air-permeability method are increased by air pressure and decreased by temperature rise; both of these results could have been predicted from the known behavior of adsorbed films.

Humidity variations have no effect.

Different gases, used as permeating fluids, produce different surface area values.

Mixtures of different sized particles give surface area results reasonably close to results calculated from the surface area of the constituents of the mixture. The most serious fault of the air-permeability method is its tendency to give high results on aged clinker.

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Stone Sand for T.V.A.

(Continued from page 48)

some degree by the moisture contained in the stone fed to the crushing plant. Under very wet conditions, screening and crushing efficiency are reduced to some degree. Under these conditions the rate of feed to the belt conveyor which discharges into the first set of rolls is cut.

Unusual Use of Bulldozer

Adjacent to the wet plant, where the final product is released into open storage, is the railroad siding where hopper-bottomed cars are loaded. Bull-dozer equipment is used to handle sand, as it accumulates, into storage piles—one on each side of the plant—and to reclaim the sand for car-loading. This type of equipment has its advantages in this kind of an operation. The pushing action of bulldozers does a good job of mixing and inter-mixing of the product as produced by the plant and is instrumental in maintaining uniformity in gradation.

Frequent handling effectively promotes drainage over the natural terrain and the mobility of these machines is used in reclaiming from anywhere in the stockpiles to load a standard car in 15 minutes. There are two hoppers, one near each stockpile area on either side of the plant, for loading into the cars. The bulldozer delivers the sand into either hopper, from which it feeds out on to a 24-in. belt discharging into the cars. These belts are on 125-ft. and 85-ft. centers, respectively. Normal procedure is to remove wet fresh sand from the plant into one stockpiling area while loading from the other side which has been drained. Sand is drained to about 12 percent moisture before loading into cars.

For loading cars, an RD7 Caterpillar Diesel tractor with a LeTourneau blade moves the sand from the stockpiles to the car-loading hoppers. An RD6 Caterpillar with a LeTourneau dozing blade moves the sand accumulation at the plant into stockpiles for drainage. This machine is also used for spotting cars during loading.

Conveyor idlers and gear speed reducer drives were furnished by the Link-Belt Co. and Goodyear belting is used throughout. The short 24-in. belt conveyors are driven by 5-hp. and 10-hp. electric motors, a 25-hp. motor drives the 36-in. belt conveyor, and a 10-hp. motor drives the conveyor feeding the wet plant. The primary rolls are driven by 200-hp. and 100-hp. motors, with 250-hp. and 100-hp. motors driving the other rolls. Knoxville

Structural Steel Co. built the plant structures.

Sand is being produced under a sub-contract to the Birmingham Slag Co. which has the contract for all the other aggregates. About 10,000 tons of sand were being kept in stock at the plant ready for shipment along with a working stockpile of 40,000 tons in the contractor's stockpiles at the damsite.

An average of thirty 55-ton cars a day were shipped for six days a week a distance of 20 miles to the damsite over the Southern railroad. Production began in November, 1940.

Design and construction of the plant were supervised by R. P. Immel, vice-president of the American Limestone Co. and C. B. Strachan, recently retired general superintendent of the American Zinc Co. operations. B. F. Gibson is superintendent of the plant.

New Type Lime Kiln

(Continued from page 55)

rock through each point in the calcining chamber is balanced against the heat available at that point for calcining and consequently a uniformly treated product is secured.

As stated before this particular unit is calcining rock from $\frac{3}{16}$ in. to $\frac{5}{8}$ in. in size. Another unit is being designed and will soon be constructed to calcine stone from $\frac{5}{8}$ in. to $1\frac{1}{2}$ in. in size. When this unit is completed, straight crushed rock in sizes from $\frac{3}{16}$ in. to $1\frac{1}{2}$ in. will be burned, the rock being screened over two storage bins, the minus $\frac{5}{8}$ in. going into the storage bin for one calcining unit and the plus $\frac{5}{8}$ in. to the storage bin for the other unit. In this way, straight crushed rock as would be fed to a rotary kiln, will be utilized in these vertical units.

This present unit as shown in the photographs is very small and compact and at present, with the low draft being used, is producing 3 $\frac{1}{2}$ to 4 tons of high calcium lime per day. By increasing the draft to 3 in., which is by no means an excessive draft figure, the unit will have a capacity of 5 tons per day. It is the intention to design these units in two small sizes only, that is of 5-ton and 10-ton capacities. The capacity of each unit can be varied over a considerable range. It is felt that these two sizes are ample and that making large-capacity units would defeat the purpose of flexibility of operation which, as ex-

plained before, comes as a result of having multiplicity of small units.

Once the unit is put into operation and conditions of draft, temperature, rate of draw, etc., are balanced, they continue to stay in balance and the unit requires practically no attention. A typical exhaust gas temperature chart on page 54 shows how steady the operating conditions are.

This unit, which was not a modification of existing methods, but a new design made specifically for burning lime will find many other uses for heat treating other types of material. It is felt that this calciner very well meets both the simplicity of operation of a rotary kiln and the heat efficiency of the shaft kiln, and to a large extent can be made to fulfill the requirements of both the small producer and the large producer of lime products.

Northwest Magnesite Building New Plant

NORTHWEST MAGNESITE CO., Pittsburgh, Penn., jointly owned by the Harbison-Walker Refractories Co. and General Refractories Co., is constructing a new plant at Cape May Point, N. J. for the production of synthetic magnesite. The company has obtained the rights in the United States to the Chesny process of production for refractory purposes and has acquired a large tract at Cape May Point together with extensive deposits of dolomite rock in Eastern Pennsylvania. Capacity of the first unit will be approximately 40,000 net tons a year, but provision will be made for adding future units.

Several plants using the Chesny process have been built in England and now supply not only the requirements of refractory magnesite for the British steel industry but also the magnesia necessary for producing magnesium metal. Magnesium metal has been produced in England from dolomite and sea water, starting with the Chesny process, since 1939. The process consists essentially in replacing the lime content of calcined dolomite by magnesia through reaction with sea water.

Erection of the new plant is being financed entirely by the Northwest Magnesite Co. and priorities have been granted to permit its completion within six months. The company increased capacity at its other plant, at Chewelah, Wash., in 1939, and a system of concentration by flotation under way at the plant will by the first of the year have nearly doubled the capacity prior to 1939.

CONCRETE PRODUCTS AND CEMENT PRODUCTS

Color Concrete

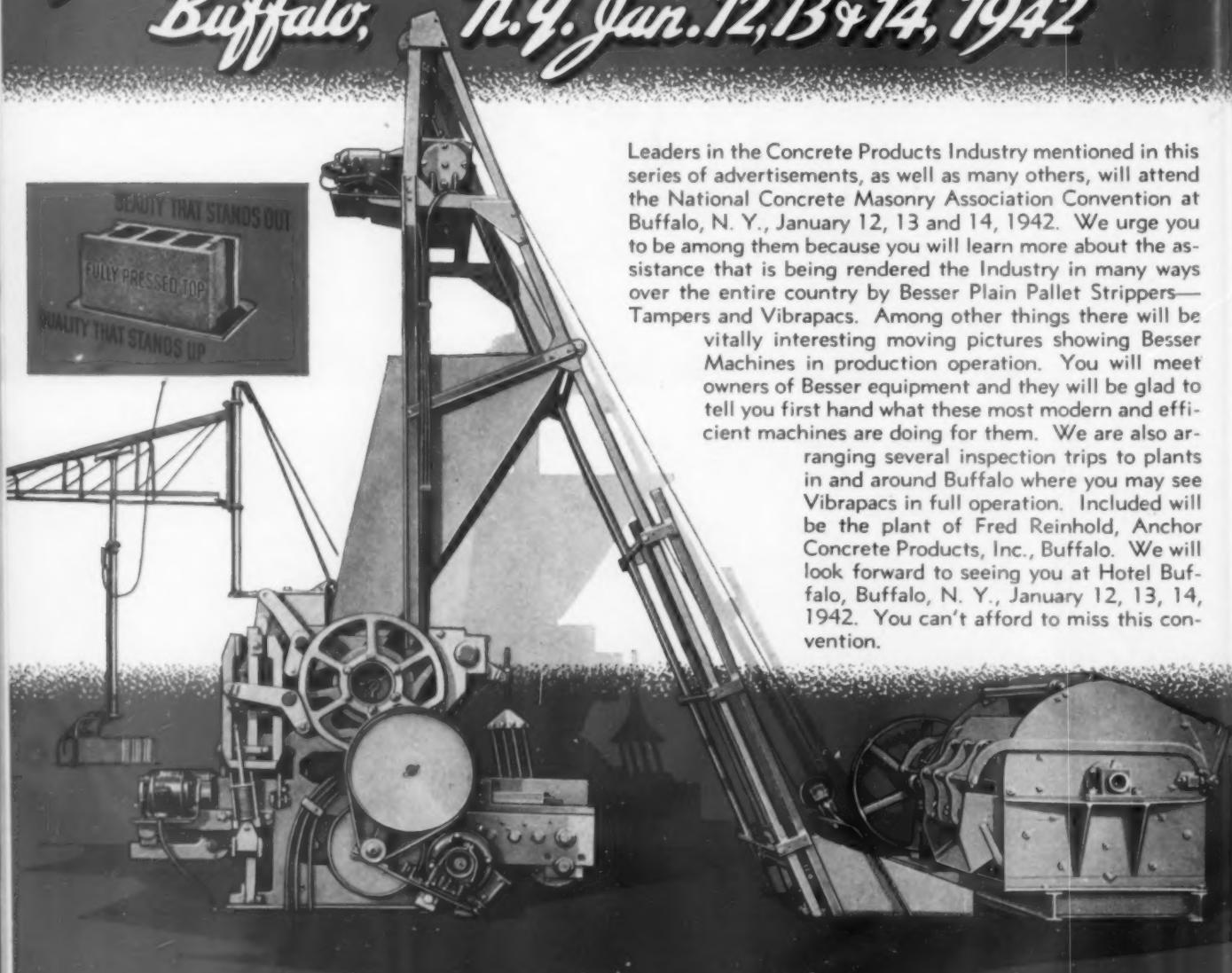
Cinder concrete masonry in ashlar pattern using units tinted with integral mixed colors



New home of Alfred D. Paolelli, assistant treasurer, Hamden Building Tile Co., Inc., Hamden, Conn.

AT THE CONVENTION

of the National Concrete Masonry Association
Buffalo, N.Y. Jan. 12, 13 & 14, 1942



Diesel Power Automatic Plain Pallet Vibrator with Mixer and Skip Loader. Capacity 600 8" x 20" x 16" per hour made 1 at a time on one plain pallet. Smaller units made in larger multiples on the same pallet.



Undirectional vibration under Flam patents (other patents pending) was employed to make the first vibrated blocks ever produced commercially. The Besser Vibrapac combines undirectional vibration with the exclusive Besser Plain Pallet principle. Users of these machines are fully protected under Besser and Flam patents.

BESSER MANUFACTURING CO.

212 FORTY-FIRST STREET

Complete Equipment for Concrete Products Plants

THE SAVING IN PALLET COST WILL PAY FOR A BESSER VIBRAPAC PLAIN PALLET STRIPPER

Leaders in the Concrete Products Industry mentioned in this series of advertisements, as well as many others, will attend the National Concrete Masonry Association Convention at Buffalo, N. Y., January 12, 13 and 14, 1942. We urge you to be among them because you will learn more about the assistance that is being rendered the Industry in many ways over the entire country by Besser Plain Pallet Strippers—Tampers and Vibrapacs. Among other things there will be vitally interesting moving pictures showing Besser Machines in production operation. You will meet owners of Besser equipment and they will be glad to tell you first hand what these most modern and efficient machines are doing for them. We are also arranging several inspection trips to plants in and around Buffalo where you may see Vibrapacs in full operation. Included will be the plant of Fred Reinhold, Anchor Concrete Products, Inc., Buffalo. We will look forward to seeing you at Hotel Buffalo, Buffalo, N. Y., January 12, 13, 14, 1942. You can't afford to miss this convention.

BESSER PLAIN PALLET STRIPPERS

A Besser Plain Pallet Stripper For Every Need

TAMPERS	Besser Super Automatic	8 Hr. Capacity 3120
	Besser Victory Automatic	8 Hr. Capacity 2160
	Besser Semi-Automatic	8 Hr. Capacity 1660
	Besser Champion, Power Operated,	8 Hr. Capacity 1000 to 1200
	Besser Multi-Mold, Hand Operated,	8 Hr. Capacity 250 to 350

VIBRATORS	Besser Super Automatic Vibrator	8 Hr. Capacity 4800
	Besser Victory Automatic Vibrator	8 Hr. Capacity 2160
	Besser Master Vibrapac, Hand Operated,	8 Hr. Capacity 800



Trim looking, modern concrete products plant of Cinder Products Corporation, Providence, R. I., which is so compact and attractive that it invites inspection. Note under-cover storage for concrete block. To the right: Close-up of plant, showing truck ramp

No Waste Motion In Block Plant

Cinder Products Corp., Providence, R. I., provides ideal working conditions for employees

BUILT OF CINDER BLOCK and structural steel, the new plant operated by Royal Sterling, president, treasurer and general manager of the Cinder Products Corp., Providence, Rhode Island, has a design and operating procedure that could well serve

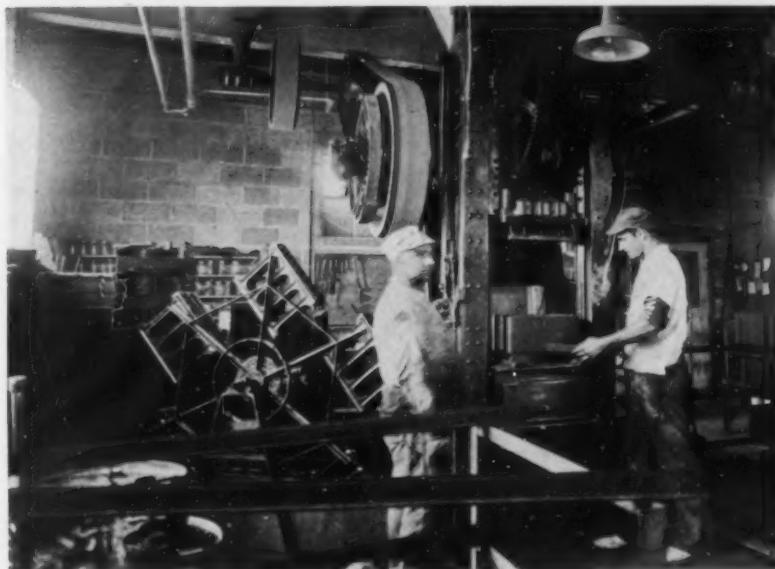
as a pattern for an efficient medium capacity layout. It is unusually compact, to hold down overhead and to keep down labor costs.

This plant has a capacity of 2000 8- x 8- x 16-in., or equivalent, units in $7\frac{1}{2}$ -hr., with a total plant area of

only 40- x 80-ft., including the curing kilns. Of the total floor plan, block are manufactured in a 40- x 40-ft. room which can easily accommodate in the future a duplicate of the present machinery to double capacity.

There are certain features in this plant that are too commonly overlooked in many concrete products plants. One is appearance. The plant is kept neat and is painted white to present an attractive outward appearance. Inside, the entire floor is of concrete and the structure is roomy and has plenty of windows, which gives the impression of an efficient atmosphere and favorable working conditions. Furthermore, the plant is swept clean after each operating shift and has a sanitary lavatory, drinking fountain and shower facilities for the employees.

Since the plant was built in 1940, covered storage has been provided all around the kiln area, which also has a concrete floor. This area covers 3000-sq. ft. to accommodate 30,000 cinder block, which makes it possible, at present capacity, to ship 28-day cured and dry units any time. These features of the plant are a decided sales asset and Mr. Sterling need not



Vibrating type block machine with pallet oller to the left



General view of plant interior. Note substantial construction, neatness, ample lighting, and complete switch panel board on the wall to the right

be at all reluctant in inviting architects and builders to see how cinder concrete units are made.

From the standpoint of operation, the plant is designed for efficiency. The kilns are tight and well-insulated and the boiler equipment is automatic to keep a constant curing atmosphere within the kilns. Roller conveyors minimize the labor in handling units from the kilns to stockpiles.

Roll Crusher Prepares Cinders

All the standard units are manufactured by a Kent-Root Vibrapress machine, which is fed concrete from a concrete mixer on the second floor. Cinders are obtained from a local power plant in trucks which dump into a hopper adjoining the plant. These cinders are low in objectionable matter and are sized from $\frac{1}{2}$ -in. down. A reciprocating feeder under the hopper passes the cinders over a Dings rotary magnet to remove iron ahead of the crushing operation. A bucket elevator raises the cinders to the head of the plant where a belt conveyor puts them over a vibrating screen which rejects plus $\frac{1}{2}$ -in. down a spout to a New Holland roll crusher. The crusher is near the boot of the elevator to close the circuit. Only a small percentage of the cinders requires reduction.

Minus $\frac{1}{2}$ -in. cinders drop into a 40-cu. yd. bin directly over an 18-cu. ft. Besser mixer. A 9-cu. ft. batcher of rectangular shape charges the mixer with two consecutive operations. This batcher is pivoted on a horizontal shaft and has arc gates top

and bottom. In the vertical position the top gate automatically remains open to receive cinders from the bin and the bottom one is closed. In charging the mixer, the operator tilts the batcher, thereby opening the discharge gate while simultaneously the bin opening to the batcher is closed.

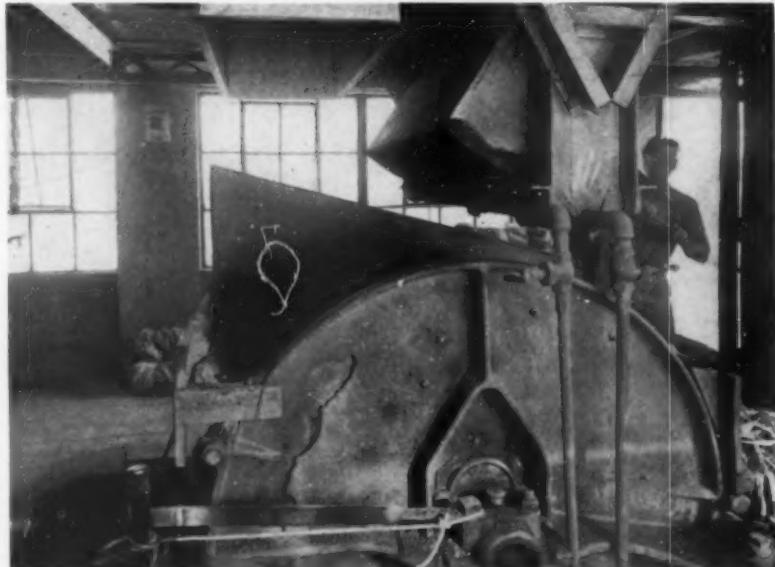
Water Heated—Winter and Summer

All the cement used is high early strength, to permit early handling of the units in yard storage. Cement is

received in sacks which are lifted and handled into the plant in slings of ten by an Electrolift hoist.

To expedite curing in the kilns, heat is applied in the concrete by heating the mixing water to 180 deg. F. in summer and winter. Heated water is released into the mixer with the cinders, followed by the cement and additional cold water. Concrete is made from a semi-dry mix and is discharged directly into the Kent machine hopper on the floor below. The machine first vibrates the concrete

(Continued on page 70)



Concrete mixer on floor above block machine. Note chute from hopper containing cinder aggregates and galvanized iron hood above mixer which removes dust from the atmosphere by means of an exhaust fan

Birmingham Likes Lime Putty

New plant of Standard Building Material Co., supplies 75 percent of all lime mortar for bricklaying

WITHIN the last six years, 14 Brooks-Taylor lime putty plants have been established in different parts of the country and all of them are successful enterprises. In cities such as Indianapolis and New Orleans, upwards of 80 percent of all the lime putty for brick mortar is aged by this process, and in Columbia, S. C., one concern is delivering an average of 90 cu. yd. a day of mortar made from aged lime putty, illustrating the extent to which the product is being accepted.

In Birmingham, Ala., where the process was originated and patented, the new plant of Standard Building Material Co., headed by Hayden Brooks, is considered to be one of the most economical operations. Mr. Brooks, who holds the basic patents, has increased plant capacity by installation of a new 2500 cu. ft. standard Chicago Bridge and Iron Works ageing tank to a total of 12,000 cu. ft. in storage, and has completed improvements in handling materials and batching operations to cut plant oper-

Close-up of lime-putty plant. Left to right: new ageing tank, batching plant and bin, and lime slaking unit

ating costs about 50 percent. It takes only one man to operate the plant, and he does most of it by pushing the proper electrical switches on the batching floor.

Back in 1926, Mr. Brooks began to slake lime in his old Blue Diamond plant which had four vats in which the lime was aged. More putty vats were added as demand was built up in the building trade. Experience with the use of vats prompted a study to improve the product, from which the use of ageing tanks with filters was evolved.

Vats had several disadvantages. It was hard to get the putty stiff enough, and the excess water needed for slaking could only be removed by evaporation, which took a lot of time.

The worst objection, however, was that there was no positive control of consistency and no two batches were alike.

Steel tanks of 2200 cu. ft. capacity were then tried and later the use of filters for removing excess water. It was found that seven days in the tanks equipped with filters would stiffen the putty as much as 28 days in the old-type vats.

After some improvements, regular and method patents were granted. In 1931, the original patent on apparatus for ageing plastic mixes was awarded, and in 1936 a patent was granted on the method of ageing. The Chicago Bridge and Iron Works contracted to build the tanks and the Warner Co., Philadelphia, Penn., erected the first plant at Wilmington, Dela. The largest single plant to date is the 30,000-cu. ft. ageing capacity unit operated by Colonial Sand and Stone Co., New York, N. Y.

Some of the plants furnish aged lime putty or ready mixed mortar, and the mortar is either mixed in transit in regulation ready-mixed concrete trucks or central mixed and delivered in dump trucks. Agitation enroute to the job is not considered necessary, but transit mixers are in use where this type of transportation equipment is available. In its new plant, Standard Building Material Co. has batching equipment for central mixing and utilizes dump trucks for haulage. All the putty is sold in the form of mortar.

Over 75 percent of all lime mortar for brick laying in Birmingham is of aged lime putty, and recently as



General view of plant. Office is at extreme left, followed by three old ageing tanks, the new tank, batching plant, and lime slaking unit at extreme right



Large sand storage facilities. Screw conveyor carries sand from track hopper, shown in foreground, to boot of elevator which raises the sand to the plant bins

much as 180 cu. yd. of mortar a day have been delivered to government housing projects. Introduction of the product required considerable selling effort at first, said Mr. Brooks, but once introduced the users—the bricklayers—have been his best salesmen due to the easy working properties of the lime mortar. Each load has a uniform, high workability as it is a "fatby" putty, building mechanics tire less by its use, more brick can be laid in a day with this mortar and delivery is simplified, according to Mr. Brook's experience.

New Plant Equipment

The new plant of Standard Building Material Co. still utilizes one of the original vats, has three 2200-cu. ft. tanks, and a new standard Chicago Bridge and Iron Works 2500-cu. ft. ageing tank, a combined total of 12,000 cu. ft. capacity. Batching equipment comprises a 2-cu. yd. Blaw-Knox sand batcher, a 1-cu. yd. Multiplex central mixer with a double set of paddles, and an overhead, two-compartment Blaw-Knox bin. This bin has a capacity for 100 tons of mortar sand and 175 bbl. of cement which is proportioned into some of the mixes.

Slaking equipment includes a standard Brooks-Taylor slaking unit with an overhead bin for high calcium lime, and a vibrating screen over which slaked lime is passed to remove core. The sand used in mixing mortar is a product containing 20 to 30 percent minus 50-mesh particles, which is considered desirable for a workable mortar.

Large Sand Storage

Reduction in operating costs is attributable in part to the system used for storing and handling mortar sand

and in the elimination of lost motion in batching and mixing. Storage capacity for sand is 10 cars, received by rail, and handled either directly into the batching bins from the cars or into reserve storage.

Hopper-bottomed cars dump into a hopper, and the sand is fed out onto a 16-in. tunnel belt conveyor on 32-ft. centers. This belt transfers to a 16-in. tunnel belt conveyor, 46-ft. centers, underlying the main storage area, which feeds the sand into a belt bucket elevator, 70-ft. centers. This elevator, with a capacity of 85 tons per hour, either fills the sand bin direct or the sand stream is diverted by a remote-controlled splitter to a spout and into the stockpile. Through tunnel gates in the 5½-x 6-ft. concrete tunnel, sand is withdrawn from storage to the No. 2 belt and then to the elevator in reclaiming from storage. No. 2 belt is driven by a chain drive from the bucket elevator.

Both lime and cement can be re-



Tunnel from which sand is drawn from storage by belt conveyor to elevator and then to overhead bin. Note chute for dumping mixer at end of shift

ceived in trucks (bulk cement) or cars discharging into a second track hopper. A 12-in. screw conveyor feeds out to a chain bucket elevator, 40-ft. centers, and cement is placed in the cement bin by a second screw conveyor, lime being fed into the lime bin over the slaking unit. Belt conveyors, screw conveyors and the bucket elevators were manufactured by the Continental Gin Co., Birmingham, Ala.

Lime, slaked at the rate of 4 tons per hour, is pumped into either of the ageing tanks by a Deming centrifugal pump with a 3-in. intake and 2½-in. discharge line. The old type vat serves as added storage capacity and as the source of feed to an R. B. Carter sludge pump which withdraws aged lime putty to the batcher.

Aged lime from either of the tanks is discharged into this vat by means of a portable discharge chute. The sludge pump operates continuously rather than intermittently, and when not batching lime mortar, a continuous stream of putty is put through the pump and returned to the vat. This is in preference to continually starting and stopping the pump. To speed operations in batching, a booster pump is used.

Batching capacity is 30-cu. yd. of mortar per hour, including weighing and mixing 7 cu. ft. of putty to a cubic yard of sand and discharging into dump trucks of 1- and 3-cu. yd. capacity. A spout from the batcher allows sand to bypass the mixer for direct truck loading.

The operator has all the controls and switches on the batching floor for the material handling equipment, pumps, slaker and all other moving machinery. A loud speaker system is the means of relaying messages from the office to the plant.

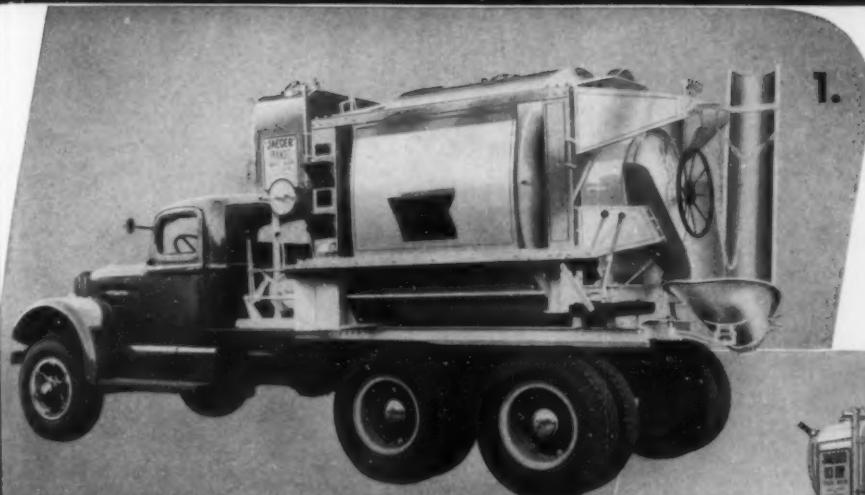
Joint Bid on Ready Mix

STEWART SAND AND MATERIAL CO. and READY MIXED CONCRETE CO., both of Kansas City, Mo., as joint bidders have been awarded the contract for concrete to be used in the construction of the duPont smokeless powder plant near Pryor, Okla. The contract calls for nearly 90,000 cu. yd. of ready-mixed concrete at a probable price between \$650,000 and \$700,000. A complete batching plant not now in use in Kansas City will be assembled at the project. Local labor will be employed.

Move Ready Mix Plant

READY - MIXED CONCRETE CO., Orange, Texas has moved to a new location at Front and Tenth streets. This company has been busy on defense contracts at Orange.

Only JAEGER Equips You to Meet EVERY Ready-Mix Demand



All Jaegers Have 2-Speed Shock-Proof Transmission—Vacuum Cab Controlled Truck Engine Drive or Separate Engine

HIGH DUMP Types:

- (2) Top Loading Models with "Sealed Drum"
- (3) Or Combination Top and End Loaders (Pat'd)

Far outselling all other high discharge truck mixers today because they are fastest to load, mix and discharge any slump concrete — and are the only high discharge truck mixers that meet every specification and job condition.

"Sealed Drum" Models take full load in one quick drop through the top. Fast Vacuum-Controlled Discharge Door seals against loss of moisture and heat in winter concrete.

Jaeger End Loading Hopper Attachment (specially adapted to older or temporary plants not equipped for ribbon loading) offers many advantages over all other end loaders — and does not interfere with use of Top Loading Door where specified by engineers. (See details at right.)

Both types are built in 2, 3, 4 and 5 yd. sizes.



JAEGER PORTABLE HOPPER

Saves Truck Mixers Waiting—Means 25%

More Pay-loads per Day on Average Job. Tows to job behind truck mixer—takes full 2 or 3 yd. batches.

One hopper serves almost any job.



All 2 Yd. Models
Mount to Advantage
on Ford-Type Trucks

Jaeger Charging-
Discharging
Hopper Attach-
ment Permits
Top or End
Loading in
Order to
Meet Conditions . . .

The only end-loader which does not constrict drum opening and slow up charging and discharge. One quick turn of hand wheel opens Discharge Gate — no need to move entire Hopper (requiring many turns of a wheel) — no second seal to leak or wear.

THIS HANDY BLANK BRINGS YOU FULL INFORMATION

Complete Data, Models, Specifications, Prices, Terms

THE JAEGER MACHINE COMPANY 603 Dublin Avenue, Columbus, Ohio

Send us newest information on Standard LOW CHARGE Truck Mixers, Agitators, HIGH DUMP Models, Portable Hoppers, Auto-Pavers and Spreaders, Pumps, Mixers, Hoists, Carts.

Name _____

Address _____



Left: Close-up of pipe and bulkheads in place. Center: Loading in progress. Right: Side view of platform after tipping

Army Witnesses Test of Concrete Pipe

AN UNUSUALLY INTERESTING TEST OF the excellent compressive strength properties of concrete pipe without reinforcement was recently made by the Sherman Concrete Pipe Co., Nashville, Tenn., in a demonstration before officers of the Army Engineer Corps. The test was made to determine the behavior of concrete pipe in a trench backfilled with crushed stone when subjected to loading, simulating conditions that may be expected when heavy concentrated surface loads are placed on trenches, such as those encountered in airport drainage.

The specimen used was an 8-in. sewer pipe with a wall thickness of $\frac{3}{4}$ -in., and a laying length of 3 ft., that was manufactured in accordance with A.S.T.M. specification C14-35 and Federal specifications SS-P-371.

A trench, 20-in. wide and 3 ft. deep, was dug in red clay for a length of about 8 ft. Crushed stone aggregate, ranging from $\frac{1}{8}$ -in. to $\frac{3}{8}$ -in. in size and well graded, was deposited in the trench to a depth of 4 in. The 8-in. pipe was placed on the bed of stone and levelled, additional material being deposited on the sides and top of the pipe to a height of 2 ft. above the barrel. All material was shovelled in but was not tamped. Wooden bulkheads about 30 in. apart restrained the movement of the stone fill in a direction along the ditch. The pipe was permitted to project through the bulkheads in order to allow for inspection during the test. One bulkhead made contact with the barrel just behind the swell to the bell end. Bulkheads were substantially braced.

The sidewalls of the ditch were whitewashed before being backfilled so that their conditions might be observed after the test had been made. Three wooden blocks 24 in. long and $18\frac{1}{2}$ in. wide were carefully levelled at the top of the stone fill,

By RALPH S. TORGERSON

2 ft. above the pipe barrel, and were used to transmit the load directly from the loading platform to the stone fill. On the contact blocks and at right angles to the trench were placed four 12-in. I-beams 17 ft. 9 in. long with a flange width of 5 in. The four beams placed side by side occupied practically the entire length of the contact blocks. Cross beams of wood resting on the I-beams, together with suitable planking, completed the platform.

Portland cement in cloth sacks unloaded from a nearby box car was used as the principal loading medium. Settlement was negligible up to a 10,000 lb. load. When the load reached 24,000 lb., the settlement amounted to about $\frac{3}{4}$ -in. At the time the platform tipped, the total settlement was approximately 2 in. When the load reached about 34,000 lbs., one bulkhead apparently collapsed, allowing part of the stone fill to be forced out into the trench. As a result, the contact blocks became inclined, which, in turn, caused the

platform to tip and the load to slide laterally to the ground. The opposite bulkhead was kicked out during the shift of the load. There apparently was a sudden drop of the load in the trench at the moment the bulkhead collapsed.

An examination of the pipe was made after the load was removed. To all appearances the pipe was intact. However, when the bell end was struck three or four hard blows with a pick mattock it broke into large chunks. The remainder of the pipe was unearthed. It was evident from the nature of the cracks at the top and sides that it had suffered failure. It is probable that this occurred the instant the bulkhead failed and the load suddenly dropped.

The sides of the trench were examined. The wall of the trench from the bottom to a point about 10-in. above the pipe barrel remained vertical. Above that point and upward to the ground surface, the side walls had a noticeable outward inclination, the maximum distortion occurring at the ground surface. There the trench was found to be 27 in. wide, the earth having been shoved outward $3\frac{1}{2}$ in. on each side. Another apparent indication that the upper portions of the trench had been subjected to heavy stress was shown by the depth of imbedment of stone particles into the trench walls and the sloughing-off of small patches of earth in this area. It would be supposed that the weakest plane of resistance to shear would be the contact surfaces between the stone fill and trench wall. However, there was no evidence to substantiate this supposition.

Conclusion

Any conclusion that may be drawn from any one test result, while furnishing considerable information, may, on the other hand, be mislead-



View after platform had tipped. Note inclination of side walls above point of arrow. Bell of pipe had been broken by pick mattock

CEMENT DISPERSION SAVINGS

Guaranteed

WRIGHT AERONAUTICAL AIRPLANE ENGINE
PLANT, LOCKLAND, CINCINNATI, OHIO.
Albert Kahn, Associated Architects and Engineers,
Detroit, Michigan.
Frank Messer & Sons, Inc., Cincinnati, Ohio,
General Contractors.
Cement Dispersion employed in
Pozzolite for mass concrete.

THROUGH SPEED AND HIGH EARLY STRENGTH

HIgh early strength concrete is an almost indispensable aid today in speeding up defense construction.

CEMENT DISPERSION, concrete's most important technologic advance in a decade — through POZZOLITH — produces 3 day normal strength in 24 hours, 7 day strength in 3 days, 28 day strength in one week — 25% more strength at later ages.

And this—with *normal portland cement*; guaranteeing important savings and vastly improved structures.

Send for Research Paper No. 36 "Economics of Cement Dispersion" and complete facts on Pozzolith.

HOW CEMENT DISPERSION WORKS

Only a part of the cementitious value of the cement, whether normal portland or high early, is utilized under usual construction conditions. Investigation shows that with 28 days curing only 50% hydrates. [Anderegg and Hubbell, A.S.T.M. 29 II 554 (1929)].

Dispersed cement produces 25% to 40% higher compressive strengths.

WITHOUT POZZOLITH

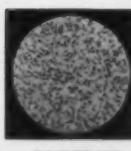
Cement particles in their normal state in water tend to gather in bunches; i.e., flocculate. Water never reaches some particles and many are only partly hydrated. This reduces the effectiveness of the cement, entraps water within the clumps, requires an excess of water for placement and often results in bleeding and segregation. See photomicrograph at right.



UNDISPERSED

WITH POZZOLITH

With Pozzolith the dispersion principle operates to drive each particle apart, thus exposing all the cement particles to the vital hydrating action. See photomicrograph at left.



DISPERSED

This dispersion makes the cement usable to its maximum efficiency since all the water is made available for lubrication of the mix and the entire surface area is exposed for hydration.

OTHER ADVANTAGES

1. Durability increased 50% or more.
2. Water reduction — up to 20% — slump increased 150% or more for given water ratio.
3. Increased water-tightness — 20% or more reduction in absorption and permeability.
4. Reduced bleeding and segregation.
5. Reduced heat with minimum cement content.

THE MASTER BUILDERS COMPANY
CLEVELAND, OHIO TORONTO, CANADA

MASTER BUILDERS

ing. However, based on this one test, there appears to be no doubt that a considerable portion of the vertical load was transferred to the trench walls by arch action or otherwise. It was evident also that the stress transfer takes place in a comparatively shallow zone below the surface; in this instance probably not exceeding 12 in. It would follow that besides the depth of backfill that the width of trench and the characteristics of the material comprising the fill and trench walls are factors to be considered.

The test was conducted through the courtesy of the Sherman Concrete Pipe Co., and was supervised by A. J. Bottiger, manager; Wendell Prather, plant superintendent; and J. N. Atkins, of the sales staff. Captain O. B. Beasley, W. L. Oden, assistant engineering aide, and J. P. Hallowes, engineer, from the U. S. Engineer Office, Nashville, Tenn., were witnesses for the Army.

Efficient Block Plant

(Continued from page 64)

through vibration of the cores and then applies pressure. An automatic pallet oiler is used, convenient to the machine operator.

Units are stacked on steel racks and the racks are hauled into the curing kilns on Yale and Towne lift trucks. There are four kilns, each 9' x 40-ft. in plan 6-ft. high holding about 800 units each. Since the plant was built, one of the kilns has been set aside for making lintels and other hand-made specials. This kiln is equipped with steam piping, so the units need not be handled at all until they have been steamed.

Steam for curing is developed by a Fitzgibbons horizontal return tubular boiler that is fired by an automatic oil burner to maintain a boiler pressure of 15 p.s.i. The boiler also heats the water for the concrete mixer.

Efficient Curing Kilns

Curing kilns are unusually efficient. They have 4½-in. reinforced concrete roofs with a 1-in. thickness of broken-joint Celotex insulation. They have dead air space insulation and tight-sealing doors at their ends. Each kiln has eight 40-ft. long 2-in. pipe for supplying heat, and live steam is introduced from the plant end of the kilns. To illustrate the insulating efficiency of the kilns, at 29 deg. F. outside temperature ice will remain

on the roofs while the inside temperature is 160 deg. F.

Blocks are often removed after 4½- to 5-hours in the kilns to open storage, where roller conveyors are used to transport to storage piles. As a general pattern of stockpiling, units are stacked wide apart and chimneyed so that there is a maximum air circulation around the units and up through the dead air spaces.

A part of the covered storage is set aside for loading trucks, under lights, during rainy weather, and interlocking movable 4' x 8-ft. galvanized roofs are sometimes placed over uncovered stockpiles.

Building code requirements are for a compressive strength of 800 p.s.i. gross area which is easily surpassed with a mix of about 1:7, rodded volume. At present most of the production is going for national defense construction, such as warehouses, partition walls, etc. Under more normal conditions, backup construction and exposed walls are important markets. For exposed work, the company has recently taken on the sales of "Thoroseal," a cement-base paint, packed in 50-lb. bags and steel drums, manufactured by Standard Dry Wall Products, Inc.

Sales are made over a radius of 50 miles, including Southbridge, Mass., and New London, Conn., and

all of the units are trucked. Mr. Sterling supervises production and promotes sales principally through architect and contractor contacts. He has prepared a colored motion picture film of plant operations and applications on the job which are shown to architects and builders.

Mr. Sterling started in the cinder block business with the Cinder Concrete Units Corp. in 1930 at Somerville, Mass. Cinder Products Corp. was formed in 1935 with a plant in Providence that was severely damaged by the 1938 hurricane. The new plant was built in 1940, high-and-dry, in a newly-developed industrial location. Other officers of the company are J. Goddard, secretary, and John Dinsmoor, vice-president. B. Tracy is superintendent of the plant.

Concrete Masonry Ass'n to Hold Three Conventions

THREE MEETINGS will be held by the National Concrete Masonry Association in 1942. The general convention of the association will be held in Buffalo, N. Y., January 12, 13 and 14 at the Hotel Buffalo. It is expected that a large attendance from every section of the country will be drawn to this meeting, but there will also be regional meetings in the southeast and southwest for those who cannot attend the national meeting. The regional meetings in February also will deal with problems which are of direct concern to companies in these areas.

The Southwest regional meeting will be at the Hotel Muehlebach, Kansas City, Mo., February 2, 3, and 4.

The Southeast regional meeting will be held in the Atlanta Biltmore Hotel, Atlanta, Ga., February 16, 17.

Pipe Plant for Joplin

LOCK JOINT PIPE CO., Kansas City, Mo., will build a concrete pipe plant in Joplin, Mo., which will cost about \$25,000.

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LOW COSTS!
in Block Production



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VIBRATION and PACKING
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KRAMER PRODUCTS CO.
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**CONCRETE BRICK
CAN BE MADE
WITHOUT PALLETS
ON THE**

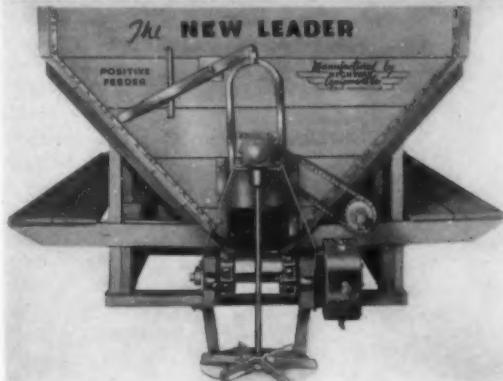
JACKSON CONCRETE BRICK MACHINE

Just Think What This Means in Dollars and cents saved in handling and upkeep as well as the cost of the pallets themselves.

Investigate today the most efficient and up to date concrete brick making equipment on the market.

JACKSON & CHURCH CO.
SAGINAW, MICH.

THE NEW LEADER LIME SPREADER



Four trucks above are equipped with LEADER Lime Spreaders.

Photo at left shows feed gate assembly and chain conveyor.

Handles Limestone Direct From Stock Pile, Wet or Dry

THE new LEADER will spread more than one ton per minute . . . users report 35 to 45 foot spread.

This modern lime spreader handles limestone direct from either wet or dry stock pile; its feed gate assembly and chain conveyor make the new LEADER a positive feed.

Manufacturers of the most complete line of spreaders, including Lime Spreaders, Sand and Cinder Spreaders for icy streets and roads, Chip and Rock Spreaders for seal coat work, Clay and Dirt Spreaders.

Some good territory still open for distributors. Write for illustrated circular and additional information.

HIGHWAY EQUIPMENT CO., INC.

CEDAR RAPIDS, IOWA
U. S. A.



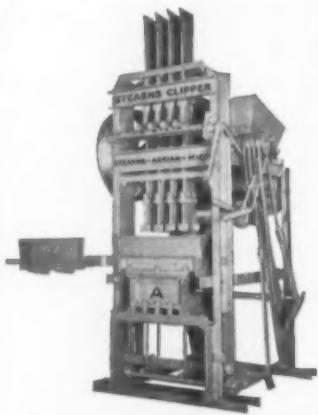
Boys, this is production!
"Running three machines one shift and two machines one shift—40 machine-hours per day—we average around 23,000 8x8x16" blocks." Jay C. Ehle.

Now they need
THREE!

ONE after another, as their vibrated building block business grew, Cleveland Builders Supply Co., Cleveland, Ohio, have installed Stearns Jolcrete Machines. That's convincing evidence that these machines—pioneers in the quantity production of vibrated concrete masonry units—live up to the claims made for them.

Write for bulletin describing Jolcrete Machines—there's a size to fit your need.

STEARNS
MANUFACTURING CO.—ADRIAN, MICH.
GENE OLSEN, PRESIDENT
MIXERS SKIP LOADERS BLOCK MACHINERY



"ANCHOR"

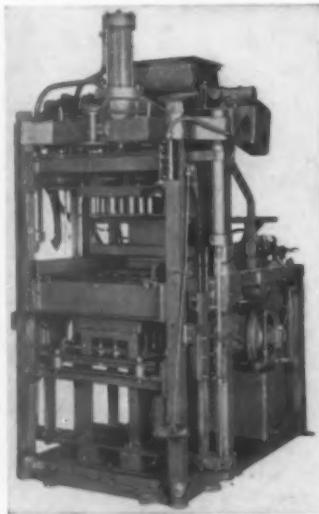
Complete equipment for making concrete, cinder and other light weight aggregate units, including engineering service for plants and revamping of old ones for more economical service. Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers, Stearns Jolcrete, Stearns mixers, pallets, Straubox Oscillating attachments, etc.

Repair parts for Anchor, Ideal, Universal, Stearns, Blystone mixers and others.

Anchor Concrete Mch. Co.

G. M. Friel, Mgr. Columbus, O.

HYDRAULIC VIBRA-PRESS



A High Production Machine Making Blocks which are Demanded by the Contractor Endorsed by the Architect Desired by the Mason

The KENT MACHINE CO.
CUYAHOGA FALLS, OHIO

HOLC Urges Use of More Concrete

IN A RECENT BULLETIN issued by HOLC, 21 types of substitute materials were suggested for use in repair, modernization and remodeling. Donald H. McNeal, deputy general manager of the HOLC in charge of reconditioning, asked for "ingenuity and resourcefulness in adding to the list."

Stress was laid on the increase in the use of concrete to eliminate the need for metal or steel reinforcement. Among the suggestions were the use of masonry piers in lieu of pipe columns; plain concrete walls of greater thickness or masonry walls in lieu of reinforced concrete; masonry or plain concrete piers or columns in lieu of reinforced concrete; thicker concrete driveways, walks or floors in lieu of wire mesh reinforced concrete; plain concrete footings of greater dimensions in lieu of reinforced concrete; and cast stone (concrete) laundry trays in lieu of enameled iron.

Add Fifteenth Pipe Unit

UNIVERSAL CONCRETE PIPE Co., Columbus, Ohio, has completed a new concrete pipe plant at Waco, Texas. The plant is located on a 10-acre site in East Waco and will manufacture, in addition to pipe, concrete block and other concrete products. This is said to be the fifteenth plant established by the company in the past 20 years.

Octagon Shape Ready Mix Plant

KAIER PAVING Co., Oakland, Calif., recently placed in operation the unusually shaped steel ready mixed concrete plant. The bin is known as the "Octo" steel bin, having segments on top to receive various gradations of aggregates. There is also a cement elevator for bulk cement. Equipment was furnished by Butler Bin Co. A

belt conveyor inclines upward from a hopper below the railroad tracks to the top of the plant. The plant is operated under the direction of E. F. Mitchler, Stockton, Calif.

Concrete Products and Cast Stone

A NEW EDITION of a book, having the above title, has come from the presses of Concrete Publications, Limited, London, England, which merits a place in the reference library of concrete products manufacturers in this country. H. L. Childe, the author, has done an excellent job in assembling the fundamental information essential for the production of precast concrete units of various shapes, building block, brick, paving kerb, slabs, ornamental pieces, and pipe. It is replete with numerous illustrations of machinery, molds and special products, and contains many drawings showing details of molds and plant layouts.

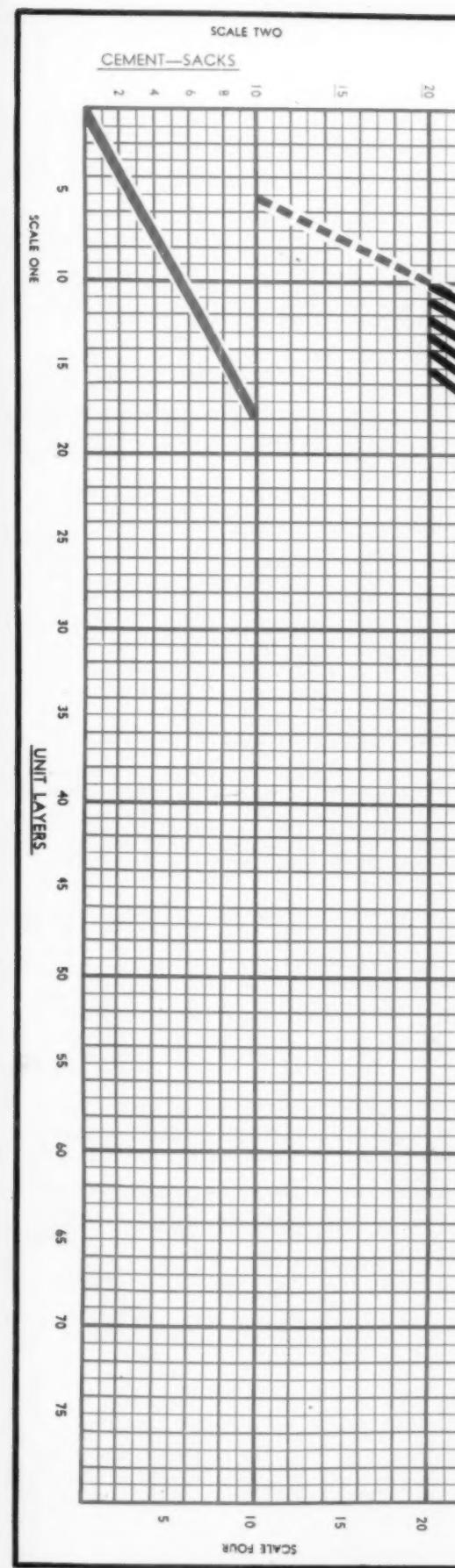
Chapters are devoted to materials, grading and proportioning, water content, measuring materials, mixing, casting, surface finish, curing, reinforcement, transportation, storage, wood, plaster, sand and gelatine molds, and methods of manufacture.

Obviously, the book is largely devoted to practices and machinery used in England and does not describe some of the mass production equipment which has been developed in this country. However, the book describes manufacturing processes and types of concrete units which have been produced in relatively large quantities over there that are just beginning to receive recognition as having commercial possibilities in the United States and Canada. The book comprises 272 pages with 252 working drawings and photographic illustrations. It sells for about \$1.70 in United States currency.



Ready mixed concrete batching plant receives aggregates by means of inclined belt conveyor from hopper at rail siding





**PROPORTIONING
CONCRETE MATERIALS
BY THE UNIT LAYER METHOD**

SCALE THREE

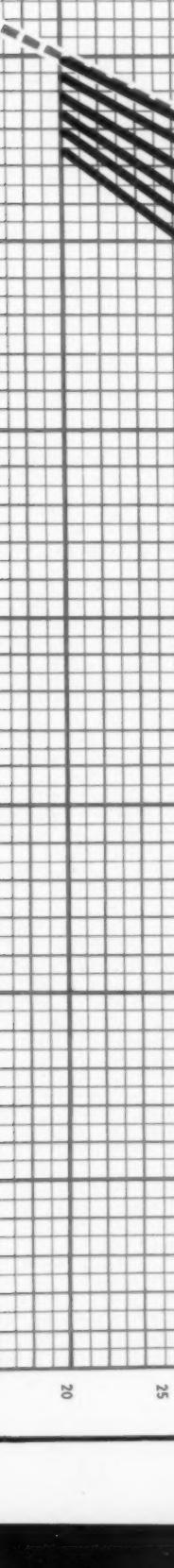
VOIDS IN AGGREGATES

0.50 0.45 0.40 0.35 0.30 0.25

AGGREGATES—HUNDREDTHS OF CUBIC YARD

95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20

WATER—GALLONS
100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20



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Proportioning Concrete Materials By the Unit Layer Method

By J. C. WITT*

IN A RECENT PAPER,¹ the unit layer method for proportioning concrete materials was explained. Tables, graphs, formulas, and examples were presented. In this method, all units of volume such as sacks (of cement), gallons, cubic feet, and cubic yards are reduced to a common unit, called the unit layer. This is a solid one yard square and 0.01 yard thick.

In this way the volume of each material may be expressed as a fraction of a linear yard—third degree quantities being replaced, in effect, by first degree quantities. It is considered that cement and aggregates may be expressed as unit layers of solids plus unit layers of voids. A unit layer refers to solids (rather than to voids) unless there is a statement to the contrary. Further work with the unit layer method has resulted in the preparation of the chart presented here. The use of colors to relate scales and graphs for each material has made feasible the development of such a chart.

Unit layers are shown on scale one, which is applicable to all materials. Although scale two has the same sequence throughout, it consists of three divisions. One scale is for cement (solid red line), another scale is for water (broken red line), and the scale in black lines is for fine and coarse aggregates. Scale three indicates the voids in the aggregate. Values for 0.25 to 0.50 are shown. Others may be found by interpolation or extrapolation. Scale four is in the same sequence as scale two and has been included for convenience.

In the form shown here, the chart is accurate to approximately 0.5 unit layer, or to 0.25 sack of cement. The original, drawn on cross section paper having ten lines per centimeter, is accurate to 0.2 unit layer. A wall chart, 40 x 50 in., on cross section paper having ten lines to the inch, would be still more accurate and convenient.

Although procedures in great variety are used in proportioning concrete materials, they necessarily have many points in common. When the quantities of materials required for a cubic yard of concrete are to be calculated, it is necessary that the voids of each aggregate (or the specific gravity and the weight per unit volume) be known, or assumed. In the

case of the latter, the calculated quantities will be no more accurate than the assumptions. Calculations may start with the aggregates or with the cement and water.

In explaining the use of the chart, one example is considered sufficient. No difficulty should be experienced in handling any other proportioning problem, along the same lines. The following information is stated:

Cement factor, 6 sacks per cubic yard
Water-cement ratio, 6 gallons per sack
Voids of fine aggregate, 0.45
Voids of coarse aggregate, 0.40
Maximum particle size of coarse aggregate, 2-inch.

Using successively the cement and water divisions of scale two, and finding the equivalent unit layer values on scale one, it is found that the cement is equivalent to 10.5 unit layers; and the water, 17.5 unit layers. Subtracting the sum of these quantities from 100, the difference is 72. That is, the space to be occupied by the solids of the fine and coarse aggregate is 72 unit layers.

At this point there is a choice of procedure. The volume of the coarse aggregate may be stated and the volume of the fine aggregate calculated; or the ratio of fine to coarse (or some corresponding ratio) may be stated, and the volume of each aggregate calculated. In this example the dry rodded volume of the coarse aggregate is 0.73 cu. yd. This is the value used by Hubbard² in his calculations. If the 73 line of scale two is traced to its intersection with the .40 line of scale three and the vertical line through this point is traced to scale one, it is found that there are 44 unit layers of the coarse aggregate. This leaves 28 unit layers for the fine aggregate. Starting with 28 on scale one, tracing to the intersection with the 0.45 void line and then horizontally to scale two, it is found that 0.51 cu. yd. of fine aggregate is required. The materials required per cubic yard of concrete are:

Cement, 6 sacks
Fine aggregate, 0.51 cu. yd.
Coarse aggregate, 0.73 cu. yd.
Water, 36 gal.
Mix, 1:2.33:3.32

Assuming that the weight per unit volume of each aggregate is known, it is convenient to batch the materials by weight.

In the example it is assumed that the aggregates are dry and non-absorbent. A trial batch should be prepared, to check the workability, and adjustments should be made if necessary. While the volume of water stated is six gallons, it is understood that this is the maximum volume permitted. Frequently this can be reduced. The manner in which the moisture content and the absorption of the aggregates may be taken into account, and adjustments in the mix may be made, will no doubt be apparent to anyone interested in the subject. These items are discussed in the former paper.

As stated by the engineers of the Bureau of Reclamation,³ the practice of batching all concrete materials by weight is increasing. The advantages of measuring by weight rather than by volume, are obvious. It should be remembered, however, that since volume is the basis for calculating the quantity of concrete, the proportioning of concrete materials is on the basis of volume, regardless of the system of batching that may be used. It should be pointed out that in tables showing the weights of concrete materials per cubic yard of concrete, the values are accurate only for aggregates having the same weight-volume relations as those used in preparing the tables. Full information should accompany each set of tables, so that if aggregates having other weight-volume relations are used, adjustments may be made.

The chart is a calculating device, and its scope, in the field for which it was designed, is unlimited. Tables contain specific values and therefore their scope is limited—regardless of their size or number. The chart may be used with facility for the preparation of concrete materials tables. With some minor changes, it may be used also for the multiplication and division of numbers from 1 to 999, when the results may be expressed in three digits.

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1. Proportioning of Concrete Materials, Concrete, 49, 33-9, (1941).
2. Materials required per cubic yard of concrete, slag, stone and gravel concrete, and cement mortar. Fred Hubbard, National Slag Association, 1940.
3. Concrete Manual, Bureau of Reclamation, 3rd edition (1941).

* Marquette Cement Manufacturing Co.



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Critical Defense Minerals

Mining engineers and geologists confer
at Rolla, Missouri, meeting of A.I.M.E.

THE FALL meeting of the Industrial Minerals Division of the American Institute of Mining Engineers, October 23-25, at Rolla, Mo., included several papers and discussions of great interest to ROCK PRODUCTS' readers. A good part of the meeting was devoted exclusively to magnesium refractories and sources of magnesium metal, major war materials, and to aluminum ore resources. Another session was devoted to miscellaneous subjects including proportioning of raw materials in portland cement manufacture and the possibilities of making lightweight aggregates from slate waste.

Magnesite and Magnesia

MAX Y. SEATON, vice-president and technical director, Westvaco Chlorine Products Corp., New York City, presented a paper containing a great deal of information on "Production and Properties of Commercial Magnesias." Among many interesting observations was this: Oxychloride cements are in much demand for naval and commercial ship decking and for flooring of special types of industrial plants, notably ammunition and shell-loading units. Also, there is expanding use of magnesia in the chemical industries. Magnesium oxide (which is magnesia) is also being added to some fertilizers.

Mr. Seaton described the growing field for a comparatively new product—activated magnesium oxides—which by special treatment develop unique properties, because of their ability to selectively adsorb a variety of organic materials, and hence can be used for the recovery of special organic values from solution, or for purification of solutions from undesirable constituents. [This ought to furnish a clue to researchers on lime, for very likely there is also a similar field for activated calcium oxide.—THE EDITOR.]

There are indications, according to Mr. Seaton, that the application of flotation methods to the beneficiation of crystalline magnesite ores may result in something approaching a revolution in their mining and processing. (Such ores are found in the Northwest.) Flotation methods which give reasonably satisfactory separation of magnesium carbonate from accompanying dolomite, calcite, and mag-

By NATHAN C. ROCKWOOD
M. Am. Inst. M. E.

nesium silicates have been developed by the Bureau of Mines and by several other organizations.

The method used for concentrating magnesite ore at the Bald Eagle mine of the Westvaco Chlorine Products Corp., is to crush and screen the ore, the major part of the impurities being in the fines which are wasted. This simple process has made many California magnesite deposits available for use in production of even high grade products. This process gets rid of most of the silica and iron, but does not appreciably change the calcium carbonate content which runs less than 2 percent.

Mr. Seaton described the Nevada deposits of brucite (magnesium hydroxide) and magnesite, which are now being developed. The two principal ones belong to the U. S. Brucite Co., leased to Basic Ores, Inc., a subsidiary of Basic Refractories, Inc., Cleveland, Ohio, and the other, Sierra Magnesite Co., is owned by Henry J. Kaiser Co. and Westvaco Chlorine Products Corp. It is believed the magnesites in this formation can be beneficiated by flotation as are those in Washington State.

Dolomite as a Source of Magnesite or Magnesia

The most generally referred-to scheme for separation of magnesia from lime in dolomitic material, according to Mr. Seaton, is what might be termed the calcium chloride cycle. This involves, basically, the suspension of calcined dolomite in calcium chloride solution and carbonation of this suspension with CO₂. A solution of magnesium chloride containing suspended calcium carbonate results. The solution and the suspended carbonate are separated by conventional methods. The magnesium chloride liquor, if treated with fresh amounts of calcined dolomite, gives a solution of calcium chloride, which can be returned to the process, and a precipitate of magnesium hydroxide, which can be separated, washed and calcined to produce any type of commercial magnesia. The patent and general literature would indicate, according to Mr. Seaton, that an almost

infinite variety of modifications of this basic procedure have been suggested. Dolomitic lime is also used as a reagent in the treatment of natural magnesium-bearing brines, instead of high calcium lime, because the process recovers the magnesia from the lime as well as from the brines.

There was a great deal more to Mr. Seaton's paper on magnesia refractories. A paper scheduled on basic refractories by Howard P. Eells, chairman of the board, Basic Refractories, Inc., was not delivered, but Mr. Eells was represented by Dr. W. J. McCaughey, Ohio State University, an expert on open-hearth refractories, who described many practical problems in connection with the use of refractories in the steel industry. Asked particularly about the future of sintered dolomite as a hearth lining, he said, in his opinion, regardless of the availability of magnesia, that sintered dolomite products would stay, because of qualities or properties that make them especially useful.

ALVIN SCHALLIS, assistant mineral economist, U. S. Bureau of Mines, read a paper on "Dolomite as a Source of Magnesia and Magnesium," which is of much interest to quarry owners of mid-west dolomite deposits. He mentioned the disadvantage of dolomite as a refractory for open-hearth steel furnaces, where there are long shutdowns, due to its instability. Some dolomite refractory manufacturers are adding a little oil to their product, he said, to prevent hydration before being placed in the furnace lining. Attempts have been made to render the lime inert by combining it with silica and iron to form stable silicates.

Mr. Schallis mentioned a new process for removing lime from calcined dolomite by treating it with moisture and CO₂ under pressure, which results in a basic hydrate of magnesia and calcium carbonate. The calcium carbonate can be removed in solution. There are various other chemical processes for separating the magnesium products from lime, one of which had already been described by Mr. Seaton. The producers active in this research are the Standard Lime and Stone Co., the Diamond Alkali Co. and Solvay Process Co. Olivine, a magnesium silicate found

(Continued on page 91)

U. S. Grants 30 Million to Mexico for Highways

AN AGREEMENT has been reached between the governments of the United States and Mexico for a loan of \$30,000,000 for highways. The money will be advanced by the Export-Import bank at the rate of 10 million a year for Mexican highway development.

Install New Kiln at Magnesite Plant

NORTHWEST MAGNESITE Co., Chehalis, Wash., has installed an additional rotary kiln with a capacity of from 100 to 150 tons of deadburned magnesite per day. This kiln is to take care of the additional production of the new plant completed in June. More complete details of the new plant appear in *ROCK PRODUCTS*, July, 1941, page 87.

Cement Mill for New Mexico?

SPRINGER, N. M., is being considered as a possible site for a defense cement plant to cost about \$1,000,000, according to local newspaper reports. The proposed site is located on the Santa Fe railroad, where a cement mill was said to have been established in 1882. It is said that a survey will be necessary first to determine the quality and quantity of the limestone available.

Authorize \$220,000,000 for Defense Highways

THE DEFENSE HIGHWAY ACT of 1941, recently passed by Congress, authorizes appropriations of \$220,000,000 in Federal funds for highways and airplane flight strips.

Seeking to meet objections which resulted in the veto of S. 1580, an earlier defense highway bill, S. 1840 authorizes appropriations of \$50,000,000 for correction of deficiencies in the strategic highway network. Half this amount would be allocated in accordance with regular Federal aid while the second \$25,000,000 would be spent by the FWA without regard to such allocations or state lines.

One hundred and fifty million dollars is authorized for construction of access roads to military and naval reservations and defense plants under direction of the President. The bill also authorizes \$10,000,000 to be matched by the states for surveys and planning and \$10,000,000 for construction of airplane flight strips alongside highways at Federal expense.

The 50-50 basis of state matching of Federal aid funds during the emer-



gency is changed to 75% by the Federal Government and 25% by the states and applies to appropriated but unexpended regular Federal aid funds for defense roads.

As a result of this legislation, a maximum of approximately \$485,500,000 could be made available immediately for defense highway purposes. In the near future, there will be added Federal allocations for 1942 of about \$137,000,000, most of which must be matched by the states.

Building Asbestos Plant

JOHNS-MANVILLE CORP., New York, N. Y., announces that an asbestos mill capable of processing large quantities of asbestos-bearing rock is now under construction on their properties in Chrysotile, Arizona, which will add substantially to the supply of asbestos fiber available in this country to meet defense manufacturing needs.

To Build Magnesium Plant

UNION POTASH Co., subsidiary of the International Agricultural Co., New York, N. Y., will build and operate a magnesium plant at Austin, Texas, financed by the Defense Plant Corp., subsidiary of the Reconstruction Finance Corp. The project includes a \$9,063,000 plant for refining magnesium, a \$1,660,000 plant for extraction of dolomite ore and \$1,500,000 for the site, utilities and other facilities.

Buys River Equipment

NUGENT SAND Co., Inc., Louisville, Ky., has purchased the sand and gravel fleet of Dillman Industries, Inc., Caruthersville, Mo., including the Diesel towboat "Kennett Dillman," the Diesel-electric dredge "Alert," a derrick boat and barges. The equipment will be operated on the Ohio river in the vicinity of Louisville. Dillman Industries, Inc., has discontinued the sand and gravel production end of its business due to increasing production costs, scarc-

ity of material in the vicinity of its operation, lack of future markets and the demands of other branches of its business.

Cement Mill Expansion

LONE STAR CEMENT CORP., New York, N. Y., has awarded a contract to the Telepsen Construction Co. to erect two raw slurry tanks and a scale and compressor building for the plant at Houston, Texas. The slurry tanks will be 28 ft. in diameter and 28 ft. high. The contract is for part of an expansion program in connection with a federal contract for 2,000,000 bbl. of A.S.T.M. type 4 cement to be used in the construction of new locks for the Panama canal. Cement will be pumped into specially built compartments of regular cargo vessels, beginning next Summer. Bids for the cement were about \$1.39 per bbl.

Gravel for Defense

KILLINS GRAVEL Co., Ann Arbor, Mich., has been extremely busy this summer furnishing sand and gravel aggregates for the new Ford bomber plant being constructed near Ypsilanti, Mich., and the necessary airport runways, etc. At one time trucks operated 24 hours per day, but they are now on a 12-hour day schedule. The haul is 28 miles a round trip. More than 150,000 cu. yd. of sand and gravel had been hauled up to the middle of November, and the job is not finished. Another company at Oxford, Mich., has supplied aggregates at the rate of 75 carloads per day. This is a rail haul. Killins Gravel Co. furnished an equivalent of 90 carloads a day by truck.

Expanding Stone Plant

SOLVAY PROCESS Co., New York, N. Y., is expanding operations at its Winnfield, La., limestone quarry. When a repair and replacement program now under way is finished, there will be practically a new plant built since the company purchased the properties. The company is also planning expansion in the soda ash plant at Baton Rouge, La., and to its brine properties in Iberville Parish, La.

Masonry for Defense

SPRINGFIELD CEMENT PRODUCTS Co., Springfield, Ohio, has built a gravel crushing plant and enlarged its capacity for concrete block. Block are in particular demand for foundation walls for homes and other defense buildings. The company is completing two large contracts near Dayton and expects to end the year with a production record of more than a half million block.

Give Your Plant a Real Xmas Present *this* Year!

—A machine that will pay large dividends for many years to come.

Put it to work on that "STICKY STUFF", or the toughest screening assignment you have. Do that—and we will guarantee you will always remain an enthusiastic booster for UNIVERSALS.

Write today for data on the latest UNIVERSAL MODELS.

UNIVERSAL VIBRATING SCREEN CO.
RACINE — WISCONSIN



LOADING

The DEMPSTER-DUMPSTER-BUCKETRUX were among the first to be called to the aid of defense and for use by industry in obtaining the demand for PEAK PRODUCTION.

DUMPSTERS are being used in rapidly increasing numbers by the experienced material handling contractors, as well as by the military services whose sole purpose is to speed up the delivery of vital supplies.

The Standard Dempster-Dumpster Truck Unit handles Drop-Bottom, Skip and Tilt Type Buckets interchangeably. Net payloads of 4500 lbs. to 12000 lbs. Sizes 1½ to 4 cu. yds. for the heaviest materials.

Write for Information

Priority Equipment Trade DEMPSTER^{Mark} BUCKETRUX For 1942 Emergencies



HAULING



DUMPING

All users state unanimously:

**THE PRODUCTION MOVES UP
AND THE COSTS DROP DOWN**
When
DEMPSTER-DUMPSTERS
Handle the Job

DEMPSTER BROS., INC.

KNOXVILLE, TENNESSEE

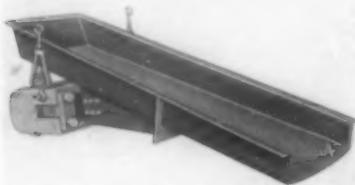
BUCKETS

NEW MACHINERY *

* NEW EQUIPMENT

Vibratory Feeder Conveyors

THE SYNTRON CO., Homer City, Penn., has added two models of electro-magnetic vibratory feeder conveyors to their line. In the illustration is shown Model F-4 which has a capacity of up to 100 tons per hour of material such as crushed rock, and carries feeder pans as wide



Heavy duty vibratory feeder

as 36 in. and as long as 60 in. The larger capacity Model F-5 will handle as much as 500 tons per hour of such material, and can be supplied with troughs as wide as 48 in. and from 60 in. to 96 in. long.

These new models, like the smaller-capacity Syntron feeders, are vibrated at high speed by a pulsating electromagnet. It is said that the patented principle of energizing these magnets through the medium of a rectifier tube accomplishes the heavy tonnage capacity. A fingertip rheostat control of the rate of flow, permits a range of feeds from a large load down to a slow dribble. There are no moving parts in the mechanism.

Small Size—Real Screen

UNIVERSAL VIBRATING SCREEN Co., Racine, Wis., has put on the market a small edition of its vibrating screen. The accompanying picture gives an idea of its size—that is the smallest size. This is called the "Univibe" vibratory riddle—riddle being another name for a foundry sieve. It is being used for screening foundry sand and in many processes where relatively small amounts of material have to be very accurately sized. For example crushed stone producers are using them for chicken grits.

The use for these screens that appealed most to the editor, after watching one in operation, is the possibility of a crushed stone, sand

and gravel, or crushed slag producer working out his sizing problems in a small pilot plant, and then duplicating the setup in his regular operation. The screen panels are inexpensive and easily changed; such panels could be kept in all sizes of mesh and experimented with to one's heart's content, without interfering with production.

The screen operates from any 110-v. 60-cycle light socket. The vibrating mechanism is the same type used on standard size screens of this manufacturer except that there are rubber-tipped spring fingers, which strike the under side of the screen cloth 7000 blows per minute, which



Sizing problems may be quickly worked out with this small screen

helps materially when screening down to minus 200-mesh, as this screen will do.

Its use as a laboratory screen is obvious. It weighs only 39 lb. and sells for \$87.50.

Journal Bearings

THE JEFFREY MANUFACTURING CO., Columbus, Ohio, has brought out an improved line of solid and split journal bearings. These precision-made bearings have machined bases and faced ends with rounded lines and smooth gun metal finish. It is claimed that the babbitted bores are broached to a smooth, hard surface, requiring no "wearing in."



Journal bearings have babbitted bores broached to smooth, hard surface

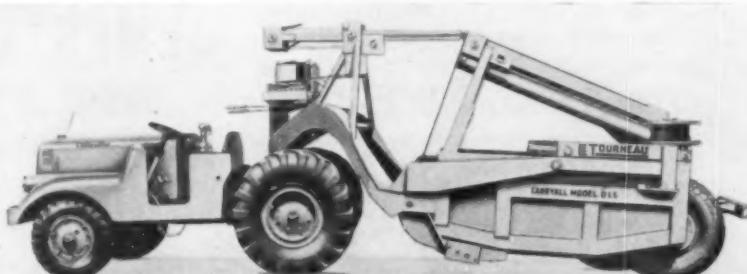
Both styles are tapped for grease cups or pressure fittings. An ample storage groove in the top provides proper distribution of lubricant. The split bearing has feeder grooves on each side.

Scraper for Use With Four-wheel Tractor

R. G. LE TOURNEAU, INC., Peoria, Ill., is now marketing its model DLS Carryall scraper, with a rated capacity of 8½ cu. yd. struck and 11 cu. yd. heaped, for use with the Caterpillar four-wheel tractor.

This model is very similar to the Model LS which has been used successfully with the Model C Tournapull. It has the same steep, long blade base, which caused material to boil in and blow back into the bowl and forward into the apron; also the same higher sides and built-up apron. Chief changes are in the yoke for mounting on the pulling tractor and the position of the power control unit.

The cutting edge is 8 ft. 6 in. With the apron cable dead ended on the apron, all hoist and unloading cables are now placed up and out of the dirt, eliminating abrasive cable wear. The Model DLS is operated by cable from a standard Le Tourneau power control unit.

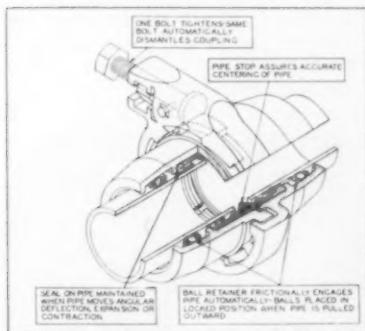


Four-wheel, tractor-drawn scraper has a 8½-cu. yd. struck capacity

Ball-Grip Coupling for Plain End Pipe

HANLON-WATERS, INC., Tulsa, Okla., has developed a ball grip coupling tested for high pressures as well as vacuum which permits flexibility at the joint and simplicity in making connection or disconnecting. Provision also has been made for expansion, contraction and angular deflection of 7 deg. each end of coupling.

The coupling consists of a housing with a ball retainer and a flexible sealing gasket. The ball retainer or cage carries a plurality of balls and a frictionally engaging means so that after the pipe is inserted and pulled outward, the balls are brought into contact with the tapered surface causing a positive lock, preventing the pipe from being withdrawn. One bolt tightens connection and the same bolt reversed automatically allows coupling to be dismantled. No special tools are required; a small size wrench is all that is necessary to take coupling off the pipe, apply tension and at the same time rotate the coupling. All couplings are provided with a pipe to assure pipe be-



Construction details of ball-grip coupling for plain end pipe

ing centered in coupling. The coupling further permits rotating of valves and fittings on pipe axis without disconnecting.

Gaskets used in this coupling are made either of synthetic or Para rubber compounds. Rubber was selected as it was believed that rubber in a buried pipe will outlast any of the metals.

Bulldozer With Tilting Device

THE BUCKEYE TRACTION DITCHER Co., Findlay, Ohio, has developed what has been called the Unitilt cable-controlled bulldozer and trail-builder for all makes and models of tractors. It has a patented tilting device and frame which permits using either Buckeye bulldozer or trailbuilder moldboards on the same frame.

The tilting device is located on one



Bulldozer with 60 in. lift of blade

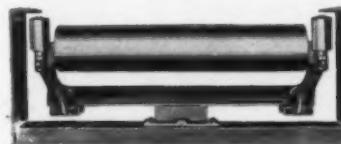
sidearm and permits raising or lowering bulldozer or trailbuilder blade at either end, a distance of 12-in. Turning one bolt only is all that is required to effect the tilting adjustment.

Self-Aligning Idler for Flat-Roll Conveyor Belts

LINK-BELT Co., Chicago, Ill., has designed a swiveling, positive, self-aligning idler for automatically correcting misalignment of either carrying or return runs of non-reversing conveyor belts supported on flat-roll idlers. This idler has a centrally pivoted cross member which, besides being equipped with a flat idler roll for supporting the belt, has a vertically-mounted actuating roll at each end for lightly contacting the edge of the belt when its lateral misalignment exceeds a predetermined amount.

Actuating rolls are carried by malleable iron brackets securely bolted to the idler frame. The underslung frame carries the pivotal mounting.

As only a slight pressure of belt edge against the actuating roll serves to swivel the idler unit on its pivot sufficiently to guide the belt automatically, quickly, and positively back to proper alignment, any possibility of injury to the belt edge is said to be avoided. When used on return runs, one idler should be placed close



Idler has sensitive anti-friction pivotal bearing

to tail or takeup shaft so that the belt will be guided centrally on the pulley, and one at every 10 to 15 idler spaces. On the carrying run, one idler should be placed just beyond the loading chute, and one at every 10 or 16 spaces thereafter.

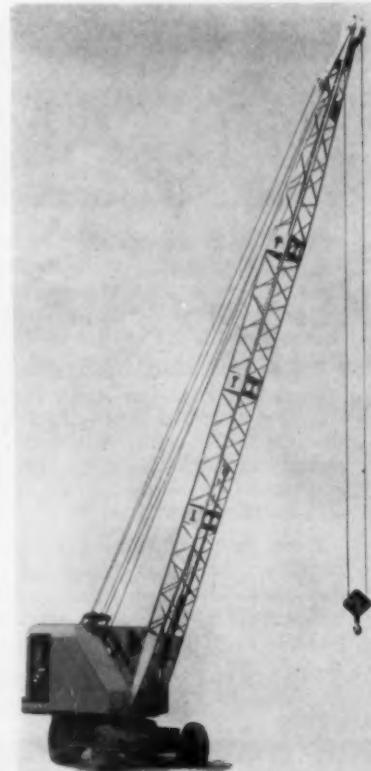
For flat-roll belt conveyors that must operate in either direction, self-aligning idlers of special design are available.

Wheel-Mounted Crane of Smaller Capacity

THE OSGOOD Co., Marion, Ohio has brought out its Model 205WM Mobilcrane in the 6-ton class. This one-man, one-motor operated, pneumatic tilted wheel mounted crane is similar in construction to this company's 15 and 20-ton models. It has a wide range of speeds for traveling, has hydraulic steering, mechanical hydraulic brakes on rear wheels, and other features that lend to its mobility and usefulness as an excavator and material handler.

Made up of I-beams and diaphragms, with welded joints, the main truck chassis is sturdily built. Screw jacks are provided on the rear bumper plate to relieve the tires of excessive loads when making heavy lifts. Outriggers are provided for working over the side.

A Clark truck-type transmission is provided on the deck, driven by roller chain, and powered through a Lipe clutch. The deck transmission is arranged with four speeds and reverse. The machine is steered by means of a hydraulic cylinder, making it easy to maneuver on the job or on the road. Brakes are mechanical hydraulic type, operated from the operator's position in the cab.



Eight traveling speeds are available in this wheel-mounted crane

FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

Calaveras Cement Co.	\$.75	Dec. 15
Canada Cem. Co.	6½%	
pfd. (p100)	2.75	Dec. 20
Canada Crushed Stone Corp. I	.10	Dec. 31
Florida Portland Cem. Co. 7% pfd.	7.00	Dec. 13
Lawrence Portland Cem. Co. Cap. (np)	.50	Dec. 15
National Gypsum Co. pfd.	1.12½	Dec. 1
Nazareth Cement Co. Com. (np)	.40	Nov. 20
Ohio River Sand Co. 7% pfd. (p100) arrears	1.00	Dec. 1
Peerless Cem. Corp.	.25	Dec. 18
Penn-Dixie Cem. Corp. 7% pfd. (arrears)	1.50	Dec. 15
Schumacher Wall Board Corp. pfd. (arrears)	4.00	Nov. 15
Spokane Portland Cem. Co. Com. (p25)	.50	Oct. 25
U. S. Gypsum Co. Q.	.50	Dec. 31
U. S. Gypsum Co. E.	1.50	Dec. 24
U. S. Gypsum Co. pfd. Q.	1.75	Jan. 2

SCHUMACHER WALL BOARD CORP., Los Angeles, Calif., for the three months ended October 31, 1941 (second quarter of the current fiscal year), reported a net profit of \$78,732 after all charges including de-

preciation, amortization, interest, federal income and estimated excess profits taxes. Indicated net profit for the first half of the current fiscal year was \$147,380, or \$1.80 on the common stock, compared with \$107,-615, equal to \$3.78 a share on the preferred, or \$1.20 a share on the common after preferred dividends, a year ago. Net in the quarter just ended was the second best in the company's history.

UNITED STATES GYPSUM CO., Chicago, Ill., and subsidiaries in the first nine months of the year had a net profit of \$4,770,658 equal, after preferred dividend requirements, to \$3.65 a share on the common stock. This compares with \$5,250,240 or \$4.05 a share for the same period in 1940. Net profit for the third quarter was \$1,558,832 as compared to \$1,713,781 in 1940. During this period operations at a number of plants were adversely affected by strikes.

LONE STAR CEMENT CORP., New York, N. Y., reported a net income of \$974,345.87 for the three months ended September 30, 1941, equal to \$1.03 a share on 948,597 shares of common stock. For the nine months, net income was \$2,908,358.33 after taxes and charges, equal to \$3.07 a share. Included in the provision for taxes for the first nine months of 1941 is \$2,491,128.09 representing estimated federal income and excess profits taxes, as compared with \$591,-619.18 for the comparable period in 1940.

NORTH AMERICAN CEMENT CORPORATION, New York, N. Y., has called for redemption on November 21 the 6½ percent mortgage bonds at 101 and accrued interest from September 1 to November 21.

PEERLESS CEMENT CORP., Detroit, Mich., stockholders, on September 9, voted to amend the charter to permit the payment of dividends, providing that the corporation shall maintain net quick assets equal to or in excess of \$500,000. A recent loan, however, requires that net quick assets equal to or in excess of \$600,000 be maintained.

For spotting your cars— JONES CAR PULLERS

YOU will be surprised how much time can be saved in the spotting and switching of cars by using a Jones car puller. These sturdy, compact units will speed up car handling to the point where they soon pay for themselves in the saving of time and labor.

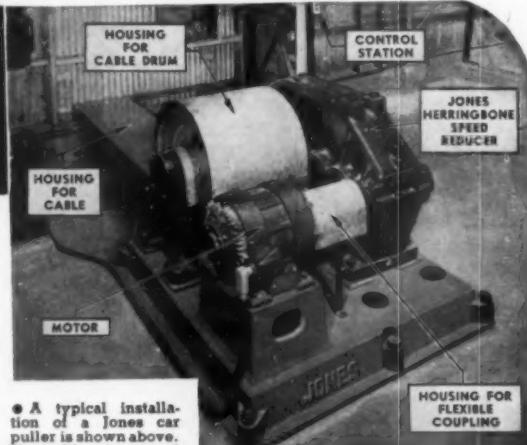
These car pullers are built by Jones as complete units with motor included if desired, or with base to take standard motor, as supplied by the purchaser. The cable drum is driven by a Jones triple reduction Herringbone speed reducer and the control station may be located at a point to give the operator a clear view of the tracks and spotting positions.

Even in plants where comparatively few cars are handled it has been found that a Jones car puller more than pays its way. Prices and complete information will enable you to judge whether such an outfit might pay out in your plant. Write for complete information.

W. A. JONES FOUNDRY & MACHINE CO.
4447 Roosevelt Road, Chicago, Illinois

Jones

HERRINGBONE • WORM • SPUR • GEAR SPEED REDUCERS
CUT AND MOLDED TOOTH GEARS • V BELT SHEAVES
ANTI-FRICTION PILLOW BLOCKS • PULLEYS
FRICTION CLUTCHES • TRANSMISSION APPLIANCES



A typical installation of a Jones car puller is shown above. The cable, drum and couplings are enclosed by sheet metal housings as an extra precaution in this installation to eliminate all hazard from moving parts.

A complete Jones car puller unit. These outfits are for use with wire rope and are manufactured in a wide range of capacities to suit the number of cars to be handled in each plant.



3 IMPORTANT DATES

For the Concrete Products Industry in 1942

Annual Convention of the

National Concrete Masonry Assn.

January 12, 13, 14

Hotel Buffalo, Buffalo, N. Y.

Regional Meeting

National Concrete Masonry Assn. National Concrete Masonry Assn.

February 2, 3, 4

Hotel Muehlebach, Kansas City, Mo.

Regional Meeting

February 16, 17, 18

Hotel Atlanta-Biltmore, Atlanta, Ga.

Within the last twenty years or so, the concrete products industry has grown from almost nothing to a position of leadership in the masonry unit field. The greatest challenge facing the industry today is to retain and expand that position.

The great success the concrete products industry has had is directly traceable to the willingness of its members to contribute the benefits of their individual knowledge and experience to the common fund of the whole industry. It is in the same spirit of mutual helpfulness that the 1942 Annual Convention of the National Concrete Masonry Association is being planned.

The convention programs will be entirely different from anything held before. There will be few, if any, speeches—but—there will be plenty of action. Rather than just talk about the things that need to be done to keep concrete masonry in front, the convention programs are being designed to show by actual demonstration exactly how to do them.

We feel so confident that the convention programs are going to be so very much worthwhile that in place of holding just one meeting, we are going to hold three meetings in various sections so that the benefits of these programs will be readily available to all manufacturers. The same program will be followed in all three cities. This will make it convenient for every plant in the United States to be represented. The head of the firm should be present as well as the salesmen and the plant superintendent.

Attendance at these meetings will not be restricted to members of the Association. Any products manufacturer who wants to keep abreast of his field and to see by actual demonstration how he can consolidate his gains and move ahead is cordially invited and urged to attend.

Pick the time and place most convenient to you and the members of your organization and make your plans to attend NOW! Now, as never before, you need the practical help that is yours for the taking at these idea-packed, profit-building sessions of men with problems identical to your own. To make your reservations and to obtain more detailed information about these meetings, address the

National Concrete Masonry Association

E. W. Dienhart, Assistant Secretary

33 West Grand Avenue

Chicago, Illinois

NEW YORK TRAP ROCK CORP., New York, N. Y., has announced that \$3,500,000 in first mortgage four percent ten year sinking fund bonds had been placed with an institutional investor. It will redeem \$3,040,000 of 6 percent bonds and \$293,500 of 7 percent debentures on December 1.

ARUNDEL CORP., Baltimore, Md., (aggregates and contracting) reports for the nine months ended September 30, 1941, a profit of \$994,877 after charges, but before federal and state income taxes, comparing with a profit of \$771,242 in the first nine months of 1940. Capital stock amounts to

466,851 no-par shares. Current assets as of September 30 amounted to \$3,864,656 and current liabilities were \$1,480,847 comparing with \$2,284,331 and \$627,519, respectively, on September 30, 1940.

PENNSYLVANIA GLASS SAND CORP., Lewistown, Penn., reported a net profit of \$519,808 for the nine months ended September 30, 1941, subject to the annual audit, after depreciation, depletion, interest and federal income and excess profits taxes under the 1941 Revenue Act. This is equal, after dividend requirements on 5 percent preferred stock, to \$1.25 a share

on 321,860 shares of common stock. Net profit for the first nine months of 1940 was \$589,221.

LEHIGH PORTLAND CEMENT Co., Allentown, Penn., had the following consolidated earnings for the 12 months ended September 30:

	1941	1940
Net before taxes....	\$4,599,439	\$2,589,173
Income and profits		
tax	2,011,554	572,617
Net profit	2,587,885	2,011,556
Times preferred		
dividends	11.40	8.86
Earnings preferred		
share	\$45.60	\$35.44
Number of preferred		
shares	56,751	56,751

NATIONAL GYPSUM Co., Buffalo, N. Y., has called a special meeting of preferred stockholders for December 12 to authorize the issuance of \$1,000,000 of three percent debentures to increase the company's cash, made desirable because of increased volume of business and higher operating costs. The company reported for the quarter ended September 30, 1941, a net profit of \$550,581, equal after preferred dividend requirements to 37 cents a share on the common. For the nine months ended September 30, 1941, net profit was \$1,200,629 comparing with \$1,055,084 in the 1940 period. Sales are reported as the highest in the company's history and operations are at capacity.

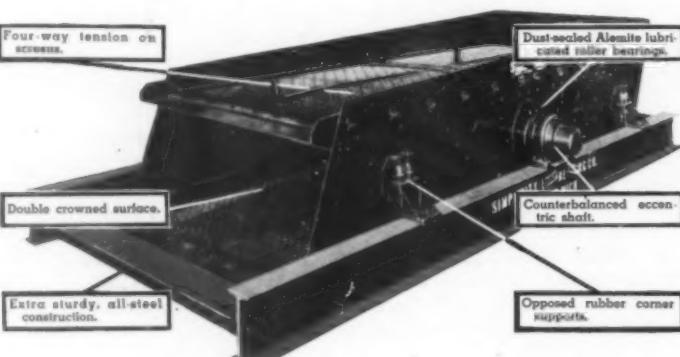
PENNSYLVANIA-DIXIE CEMENT CORPORATION, New York, N. Y., presented the following comparative statement of earnings for the 12 months ended June 30:

	1941	1940
Net sales	\$8,577,778	\$6,570,291
Cost, expense &		
ordinary tax	6,348,924	5,164,805
†Depreciation &		
Depletion	463,835	471,703
Operating profit	\$1,765,019	\$933,783
Other income	41,652	28,126
Total income	\$1,806,671	\$961,909
Interest	276,243	378,254
Profit	\$1,530,428	\$583,655
Federal inc. tax	387,000
Excess profits tax	86,250
Net profit	\$1,057,178

*Before federal income taxes. †Total depreciation and depreciation charged for the 1941 period amounted to \$924,670 of which \$463,835 (basis used for present federal income tax purposes) was charged to operations.

Cement for Hawaii

SANTA CRUZ PORTLAND CEMENT Co., Davenport, Calif. plant, recently shipped 40,000 bbl. of portland cement to the Hawaiian Islands on its carrier, the "Santacruzement." The cargo was for use in the construction of a new aviation base.



Simplicity
ENGINEERING COMPANY - DURAND MICH.



Cut YOUR PRODUCTION Cost!

The speed and exactness with which American Crushers can turn out a uniform finished product mean less production cost for you—and these two requirements of a crusher are most important in meeting today's tempo. Sturdily constructed and with capacities from 10 to 100 tons per hour, there is a size to meet your need.

Investigate today for bigger profits.

AMERICAN PULVERIZER CO.
1245 MACKLIND AVE. ST. LOUIS, MO.

How You Can Solve HIGH PRICES and SHORTAGES



In essential materials used daily in tremendous volume by the building industry.

You use your surplus aggregate. We equip you with special line production machinery. Only modest investment required—balance easy monthly payments.

Scores of established manufacturers have proven the quality and salability of product, as well as the earning power and stability of this business. (Names on request.)

This opportunity offered only one man in each community to make this proven low-cost material. (Samples furnished.)

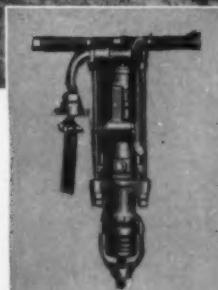
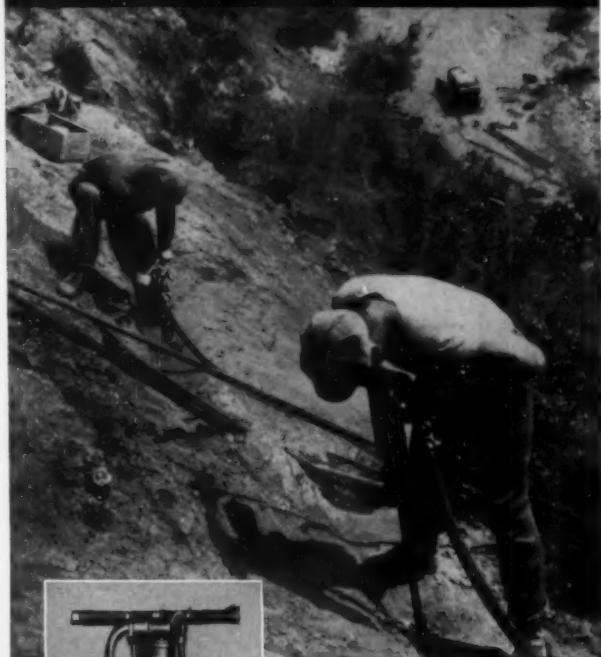
Act now while your territory is still open. Write or wire for Free Books and learn how you, too, can own one of these profitable businesses.

W. E. DUNN MFG. CO.
23 W. 24th St. Holland, Michigan



DECEMBER, 1941

MORE FOOTAGE PER DRILLING DOLLAR



Weighs only 47 lbs.
21 inches overall,
including retainer
Strong Rotation
Good hole cleaning
capacity
Economical drilling
depth, 8 to 12 feet
Automatic lubrication
Fully-cushioned
piston bushings

SINKER DRILLS
DRIFTERS
STOPERS
DIAMOND CORE DRILLS
WAGON DRILLS

LOW MAINTENANCE SINKER CUTS QUARRY COSTS

Weighing only 47 pounds, fast, well-balanced and easy to handle, CP 32 is an ideal sinker drill for the quarry. Its high speed, low air consumption and unusually low maintenance will give more footage per drilling dollar.

Check these outstanding advantages of the CP 32 Sinker Drill. Write for further information.

**CHICAGO PNEUMATIC
TOOL COMPANY**

General Offices—6 E. 44th St., New York

CHICAGO

PNEUMATIC

ROCK DRILLS

ALSO: Air Compressors, Pneumatic Tools,
Electric Tools, Diesel Engines,
Hydraulic Aviation Accessories

Special Quarry Code Committee

AT A SPECIAL MEETING of the Cement and Quarry Section of the National Safety Council, the following Special Quarry Code Committee was appointed: J. R. Boyd, chairman, National Crushed Stone Ass'n.; D. Harrington, U. S. Bureau of Mines; F. Hunt, plant manager, Dewey Portland Cement Co., Davenport, Iowa; C. F. Lewis, plant manager, Volunteer Portland Cement Co., Knoxville, Tenn.; Daniel Baker, Jr., vice-president, Standard Lime & Stone Co., Baltimore, Md.; F. J. Buf-

fington, New York Trap Rock Corp., New York, N. Y.; A. J. R. Curtis, Portland Cement Association, Chicago, Ill.; R. A. Dittmar, Universal Atlas Cement Company, Hudson, N. Y.; W. M. Powell, Medusa Portland Cement Co., general chairman, Cement and Quarry Section, N.S.C., Cleveland, O.

More Cement Storage

CUMBERLAND PORTLAND CEMENT CO., Cowan, Tenn., has let a contract to the Rust Engineering Co., Birmingham, Ala., for additions to its storage and distribution facilities. The cost, including equipment, exceeds \$70,000.

Shortage of Paper Closes Gypsum Plant

EBSARY GYPSUM CO., Inc., Newark, N. J., officials claimed that lack of coöperation by OPM was responsible for the recent shut down of its plant at Wheatland, N. Y. The plant, engaged in filling defense orders for plaster board used in federal housing and army cantonments, was closed because of a shortage of chip board paper. Lack of establishment of priorities, while allowing the required paper to be used in non-defense industries, was blamed.

Celebrates 25th Anniversary

THE BARBER-GREENE CO., Aurora, Ill., celebrated the 25th Anniversary of the founding of the company at a banquet on October 21, 1941. As Mr. Greene, vice-president, treasurer and co-founder, in an illustrated talk full of anecdotes and philosophy, told of the founding and early struggles of the company, many of the employes were surprised to see themselves on the screen as they appeared 25 years ago. Founded by Harry H. Barber and William E. Greene when the first World War flamed over Europe, Barber-Greene has been playing a major role in the second World War. Its labor and time-saving equipment are extensively used, both here and abroad, in war and national defense work. Service pins for 5, 10, 15, 20 and 25 years were awarded to 203 members of the company.

Quarry Purchased for City Water Supply

STANDARD LIME AND STONE CO., Baltimore, Md., has sold its "West Quarry" at Martinsburg, W. Va., to the city for \$10,000. The quarry was desired as a source of water supply for the city. It is planned to install a pipeline from the quarry to the water works where the water will be purified.

Installing Dust Collectors

DEWEY PORTLAND CEMENT CO., Davenport, Iowa, is now installing Buell dust collectors on their three wet process kilns. The three kilns are 11-x 175-ft. This installation, which will comprise 36 cyclones, is expected to handle a volume of gas estimated at 300,000 c.f.m. at 650 deg. F.

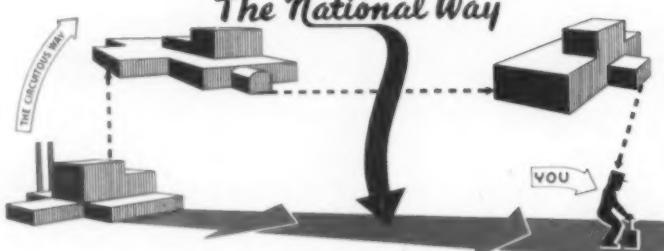
New Gravel Plant

SOUTHEASTERN SAND AND GRAVEL CO., Union Springs, Ala., has established a plant at Leslie, Ala., that will employ 50 to 70 men. Investment in the plant is about \$40,000.

LIKE AN OLD MAN, DYNAMITE TOO, SLOWS DOWN WITH AGE



The National Way



FRESH DYNAMITE

THE NATIONAL POWDER CO.
ELDRIDGE • FACTORY-TO-YOU • PENN.



More SAVINGS... Less Priority Worries

Instead of sending these large hammers to the scrap pile and buying a new set the plant operator had them built up and hard faced with Coast Metals No. 112—Red Tip.

He no longer has to worry about whether his hammers will wear out before a new set can be delivered as the hammers can be faced again and again and each facing will give several times the life of uncoated hammers.

Coast Metals are austenitic and severe impact and abrasion increase their initial hardness.

Coast Metals engineers will be glad to help you solve your maintenance problems.

Write for complete details on our hard facing metals.

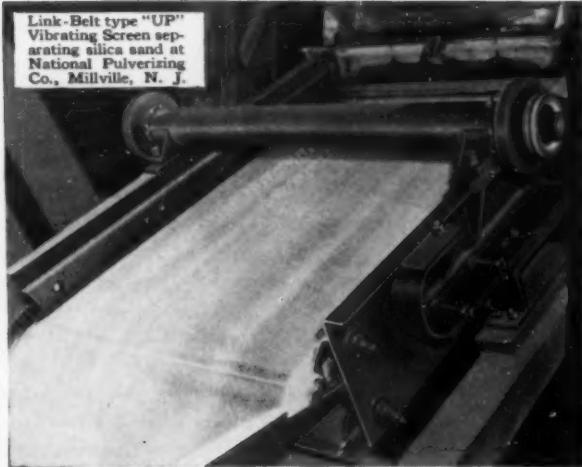
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Metal Parts & Equipment Co. Chicago, Ill.	J. B. Crane 3115 W. 38th Cleveland, Ohio
Hutchinson Sales Co. Detroit, Mich.	Presto Battery Co. Hartford, Conn.
S. C. Lum 983 Colonial Ave. Union, N. J.	Morris, Wheeler & Co. Philadelphia, Penna.
Weldcraft Equipment Co. Pittsburgh, Penna.	Hill Equipment Engineering Co. St. Louis, Mo.
Maryland Oxygen Co. Baltimore, Md.	Fetzer Equipment Co. Youngstown, Ohio

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LIMA LOCOMOTIVE WORKS, INCORPORATED

Shovel and Crane Division

LIMA

OHIO

L I M A

Truckers Strike

TWO HUNDRED TRUCK DRIVERS hired by two construction material companies that supply the Wolf Creek shell loading project with gravel have gone on strike for higher wages. The drivers, in their own trucks, operate for the Memphis Stone and Gravel Co. and the Cartwright Construction Co. to Milan, Tenn., a distance of 42 miles. It is said that the drivers have been paid \$1.15 a ton and that they could make four round trips of six tons daily. An increase to \$1.50 a ton is asked.

Planning \$100,000 Plant

A LOS ANGELES GROUP is planning to build a plant near Corona, Calif., to process a fine-grained igneous rock that is said to have unusual hardness and other favorable qualities. It is said that more than \$100,000 will be spent for mining equipment, trams, crushers, buildings and other equipment.

Move Brick Unit to Job

QUARTZITE STONE CO., Lincoln, Kan., has moved its concrete brick machinery to Kinsley, Kan., where it has a contract to manufacture brick for a new school building. Local sand and gravel will be used for aggregates.

IN quarry work or wherever the digging is tough, LIMA shovels are in there producing big, profitable tonnage day in and day out. They ask no favors because they have what it takes to see the job through. LIMA quarry shovels have strong, sturdy front ends that can take tough digging without coaxing; power is not lost through long complicated gear trains; independent clutches make it possible to hoist, swing, travel and boom up or down simultaneously, and noise and gear wear is practically eliminated by the use of helical cut gears. In addition to the above advantages, friction is cut to a minimum by the use of anti-friction bearings at every vital bearing point. LIMA shovels are built in $\frac{3}{4}$ to $3\frac{1}{2}$ cubic yard capacities. Bulletins are available on any size.

**SHOVELS - CRANES
DRAGLINES**

Acquit Gypsum Officials In Anti-Trust Suit

WITHOUT HEARING any defense evidence, Federal Judge Thomas A. Goldsborough of the District of Columbia on November 19 directed a verdict of acquittal in the anti-trust action against the United States Gypsum Co., National Gypsum Co., Certain-teed Products Corporation, Newark Plaster Co., and Ebsary Plaster Co., and eight individual officers of these companies. The government had charged conspiracy of the defendants to fix prices of gypsum wallboard and lath.

The government had presented evidence since October 13, and at the close of its case the defense introduced motions for the directed verdict. Judge Goldsborough, in granting the directed verdict, held the government had introduced no evidence to substantiate the conspiracy charge.

Products involved in the trial are covered by patents owned by United States Gypsum Company, and the other corporate defendants manufactured the products under licenses.

Sell Vessel

ROCHE HARBOR LIME AND CEMENT Co., Roche Harbor, Wash., has sold its vessel, the "Roche Harbor Transport," to A. B. McCallum of Chicago. In the face of an increased demand for cargo carriers because of the war, the new owner will recondition the craft as a full rigged cargo carrier which will be placed probably in the lumber trade between the Northwest and Australia. The "Roche Harbor Transport" was once a famous sailing ship and was built in Scotland in 1868. It was purchased by the Roche Harbor Lime and Cement Co. in 1927 to transport its products to California coast markets.

Phosphate Improvements

HOOVER AND MASON PHOSPHATE Co., Chicago, Ill., is completing important changes to its plant at Mt. Pleasant, Tenn., having to do with the intake end to the washing plant. The tower and skip bucket arrangements ahead of the washing and drying plants are replaced by belt conveyors from ground storage, which permits both selective washing and selective drying, as well as selective mining for adjusting the grade to the desired figure.

Wage Increase

SOUTHERN ROCK ASPHALT Co., Oklahoma City, Okla., has granted wage increases of 15 to 25 percent to employes, by friendly agreement, in recognition of the rising costs of living.



MODEL 51

BLAST HOLE DRILL

WELDED and RIVETED

In steel fabrication some say one thing and some say another.

KEYSTONE by-passes the argument by employing both methods in the construction of well drill frames, which are welded and riveted.

As a matter of fact we have found that this combination gives the best, most rugged and durable frame foundation that can be designed for a well drilling machine. And the frame under a blast-hole drill has to be tough to stand the never-ending stress and jar of pounding down six-inch holes in hard rock.

Other details of the design of Model 51-Crawler traction quarry drill are in keeping. Shafts and bearings are over-size. Structural members are of ample form and section dimensions. Bearings are of anti-friction type. The length and character of the drilling stroke are adjustable to give greatest efficiency. Model 51 is a modern, streamlined rock borer—the latest product of an old and well known shop.

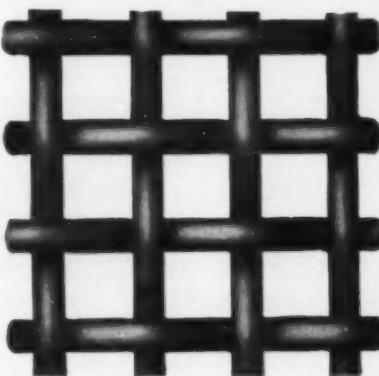
You will want to know more about it. Ask for bulletin BD-142.

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Beaver Falls, Pa.**



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ROEBLING STEEL Assures Long Life

Roebling "Abraso" Screening is made of special steel—manufactured by custom methods in Roebling's own mill. It is steel that offers maximum resistance to the BEATING of stone and gravel.

To further assure long screening life, Roebling controls every step of manufacture from steel making to fabrication.

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What Causes Volume Changes In Masonry?

By F. O. ANDEREGG

IT HAS BEEN SUGGESTED that mortar is progressively cracking away from the units in many of our masonry walls, due to differential volume changes. Wetting and drying of the walls and temperature variations are blamed. Furthermore, it has been maintained that the worst effect is produced where the mortars are strongest. Experimental results are cited showing that mortars rich in

portland cement have a greater wetting and drying volume change than do mortars high in lime. These results were obtained, however, with specimens molded in metal and free from those restraints under which mortar exists in the wall. Is it fair and proper to extrapolate the results so obtained to the masonry wall where conditions are quite different? A brief analysis follows. Expansions due to wetting and contractions caused by drying have been studied by various experimenters. Typical results are given in the following table:

In addition Voss¹ has reported initial shrinkages of metal-molded prisms of the order of 0.20 percent, while Palmer² published initial shrinkage results reaching a maximum of 0.40 percent with a high-yield lime-putty mortar.

The conditions under which these results were obtained cover a rather wide range of time, of water-cement

and of aggregate-cement ratios and of aggregates. The higher the water content and the greater the separation of broken solids, the greater is the initial shrinkage and the larger are the cyclic changes on wetting and drying. The metal-molded specimens containing most portland cement expanded and shrank the most, but this did not seem to hold for the mortars actually measured in the wall. The reason lies in the rapid removal of moisture from the high cement mortar so that the distance between the cement grains, and between the cement and aggregate particles is considerably diminished, as the wall is laid up.

(First article of a series on the controversial subject of Volume Changes In Masonry.)

1. Anderegg, F. O., Architectural Record, (1931) No. 9, p. 202.

2. Anderegg, F. O., ROCK PRODUCTS, (1940) No. 10, p. 37. Also unpublished results.

3. Anderegg, F. O., Proc. Am. Soc. Testing Mat. 40, II, (1940), p. 1130.

4. Anderegg, F. O., Ibid 35, II, (1935) p. 446.

5. Anderson, Kenneth, Thesis, Univ. Minn., 1941.

6. Davis and Troxell, Proc. Am. Concrete Inst. 25 (1920) p. 210.

7. Fitzmaurice, R., "Principles of Modern Building," Vol. I, 2d Ed., H. M. Stationery Office, 1939.

8. Myers, S. L., Ind. Eng. Chem. 32, (1940) No. 8, p. 1107.

9. Palmer, L. A., J. Am. Cer. Soc. 14 (1931), p. 154. J. Res. Bur. Standards, 6 (1931) p. 1003.

10. Ross C. W., Ibid, 27 (1941) p. 197.

11. Staley, Howard R., National Lime Association (Lectures 1939, 1940).

12. Staley, Howard R., J. Boston Soc. Civ. Eng. 27 (1940) No. 4, p. 251.

13. Voss, Walter C., National Lime Association (Lectures 1938, 1939).

14. Withey and Wendt, Proc. Am. Soc. Testing Mat. 35, II (1935) p. 426.

Critical Minerals

(Continued from page 77)

in the Southeast, is also a possible source of magnesium products.

The other paper of most interest to Rock Products' readers dealt with proportioning raw mixes for portland cement. The following day a considerable number of the mining engineers went through the Prospect Hill plant of the Missouri Portland Cement Co. and saw the process described in operation.

Proportioning Cement Raw Materials

HOWARD S. PONZER, assistant to the general superintendent, Missouri Portland Cement Co., St. Louis, Mo., in his paper "Proportioning Raw Materials for Cement Manufacture under Modern Conditions" reviewed developments in cement manufacture from the time when control of raw mix consisted chiefly of controlling the calcium carbonate constituent. With the coming of five separate and distinct types of portland cement, various refinements have become necessary. This has led in the most highly developed plants to direct weighing of all materials entering the mix, together with selective quarrying.

Experience in the research laboratory and in the daily production of clinker in many plants, according to Mr. Ponzer, has demonstrated that when the raw mixtures have been designed to produce a specified theoretical compound composition in the clinker, the performance of the mix during the burning operation remains substantially constant and that the characteristics of the clinker when ground into cement can be predicted fairly accurately, provided the burning, clinker cooling and subsequent grinding operations are conducted under rigid and well controlled conditions.

A further advantage derived from closer control of raw material quantities afforded by proportioning by weight, which, he said, is advantageous from an operating standpoint, is that the size of the required storage capacity for finish ground raw materials is likely to be reduced. By exercising greater control over materials before they are ground, the need for elaborate storage facilities for blending purposes is correspondingly reduced. This has the double advantage of saving on costly storage, and of permitting greater flexibility in accomplishing composition variation when a number of types of cement are manufactured.

However, as he explained, the method of proportioning by weights

has its faults, the chief being probably the inability to know the composition of the various raw materials accurately enough to take full advantage of relatively precise scale weights. Segregation in handling and storage of these raw materials is a major problem. Consequently handling and processing have to be in keeping with the material proportioning installation. Variation in the moisture content is another factor making for errors, unless the process be the dry one in which the raw materials are dried before proportioning.

Mr. Ponzer's paper included a discussion of the advantages and disadvantages of closed-circuit grinding. Significant was his statement: "Separate wet grinding of the various raw materials is now beginning to come into use as a means of utilizing closed-circuit grinding methods, and yet accomplish quick composition changes when desired, and to overcome proportioning station handicaps. It appears safe to say that this type of operation will find wider application as time progresses." He also pointed out that developments in dry blending made the same processing possible in dry-process plants. The disadvantage of separate grinding of raw materials is the more elaborate facilities required for storage and blending, and the possibility of small errors of proportioning being magnified.

COMING CONVENTIONS

National Concrete Masonry Association, Hotel Buffalo, Buffalo, N. Y., January 12 to 14, 1942.

National Crushed Stone Association, Netherlands Plaza Hotel, Cincinnati, Ohio, February 2 to 4, 1942.

National Lime Association, The Homestead, Hot Springs, Va., May 26 to 28, 1942.

National Ready-Mixed Concrete Association, Netherlands Plaza Hotel, Cincinnati, Ohio, January 28 to 30, 1942.

National Sand and Gravel Association, Netherlands Plaza Hotel, Cincinnati, Ohio, January 28 to 30, 1942.



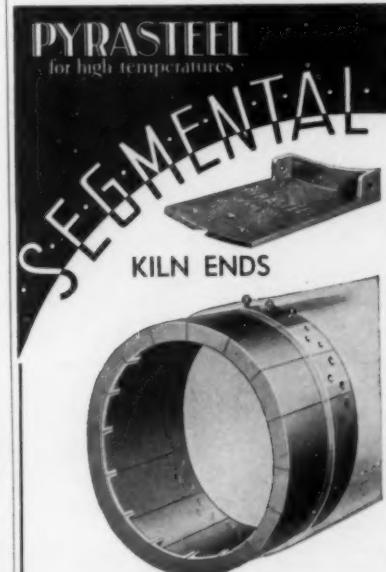
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Small power
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Federal Contract Awards

AWARDS made by Federal governmental agencies to rock products companies for the period from October 1 to November 8 as reported by the Division of Public Contracts, Department of Labor, are as follows:

Cement

- *Indefinite Amounts
- **Various Sources
- †Estimated

U. S. Steel Export Co., Washington, D. C., Panama Canal, \$306,000

*Superior Cement Corp., Superior, Ohio, from Herr Bros., Portsmouth, Ohio

*Wabash Portland Cement Co., Osborn, Ohio, from The Hoefer & Stoecklein Co., Dayton, Ohio

*Wabash Portland Cement Co., Osborn, Ohio, from Central Builders Supply Co., Springfield, Ohio

*Pittsburgh Plate Glass Co., Columbia Cement Div., E. Fultonham, Ohio, from Bates Bldg., Material & Supply Co., Steubenville, Ohio

*Lone Star Cement Corp., Spicati, Ala., WPA, \$11,900

*Superior Cement Corp., Superior, Ohio, from The Marietta Concrete Corp., Marietta, Ohio

*Superior Cement Corp., Superior, Ohio, from The Logan Mfg. Co., Logan, Ohio

*The Bessemer Limestone & Cement Co., Walford, Penn.

Alpha Portland Cement Co., Phoenixville, Ala., WPA, \$18,460

*Alnico Portland Cement Co., Ironton, Ohio

*Southwestern Portland Cement Co., Osborn, Ohio, from Fegf & Fleckenstein, Inc., Sidney, Ohio

*Superior Cement Corp., Superior, Ohio, Fairley Hdwe. Stores, Hillsboro, Ohio

Glens Falls Portland Cement Co., Glens Falls, N. Y., War, \$50,000

Edison Cement Corp., New Village, N. J., War, \$36,360

*West Penn Cement Co., West Winfield, Penn., from M. C. Robinson & Co., Ashtabula, Ohio

*Pittsburgh Plate Glass Co., Columbia Cement Div., E. Fultonham, Ohio

Penn-Dixie Cement Corp., Kingsport, Tenn., WPA, \$20,970

*Lehigh Portland Cement Co., Newcastle, Penn., from Myers Produce, Gallipolis, Ohio

*Medusa Portland Cement Co., Wampum, Penn., Silica and Baybridge, Ohio

Lawrence Portland Cement Co., Rockland, Maine, War, \$34,845

*Huron Portland Cement Co., Toledo, Ohio, from The Kuhlman Builders Supply & Brick Co., Toledo, Ohio

*Huron Portland Cement Co., Toledo and Cleveland, Ohio

*The Diamond Portland Cement Co., Middle Branch, Ohio

*West Penn Cement Co., West Winfield, Penn., from The Youngstown Bldg. Material & Fuel Co., Youngstown, Ohio

*West Penn Cement Co., West Winfield, Penn.

*Wabash Portland Cement Co., Osborn, Ohio

*Lehigh Portland Cement Co., New Castle, Penn., from The Union Lumber Co., New Philadelphia, Ohio

*Superior Cement Corp., Superior, Ohio

*Standard Portland Cement Co., Painesville, Ohio

*Huron Portland Cement Co., Cleveland, Ohio, from The Goff-Kirby Co., Cleveland, Ohio

*Southwestern Portland Cement Co., Osborn, Ohio

*Pittsburgh Plate Glass Co., Zanesville, Ohio, from Morris Coal Co., Springfield, Ohio

*Pittsburgh Plate Glass Co., Zanesville, Ohio, from The Cincinnati Builders Supply Co., Cincinnati, Ohio

*Pittsburgh Plate Glass Co., Columbia Cement Div., E. Fultonham, Ohio, from The Botzum Bros. Co., Akron, Ohio

California Portland Cement Co., Colton, Calif., War, \$197,000

Alpha Portland Cement Co., Birmingham, Ala., War, \$37,085

Universal Atlas Cement Co., Birmingham, Ala., War, \$36,064

**J. Watts Kearny & Sons, New Orleans, La., WPA, \$36,810

*Southwestern Portland Cement Co., El Paso, Texas, WPA

*Riverside Cement Co., Crestmore, Calif., WPA

Pacific Portland Cement Co., San Juan Bautista, Calif., WPA, \$15,600

Pacific Portland Cement Co., San Juan Bautista, Calif., WPA, \$26,200

*Universal Atlas Cement Co., Birmingham, Ala., War, \$163,980

**Fullerton Lumber Co., Sioux City, Iowa, WPA, \$16,787

Sand and Gravel

†Estimated

Smith Gravel Co., Inc., Hartford, Ala., War, \$27,202

Roseburg Sand & Gravel Co., Roseburg, Oregon, WPA, \$18,000

*Diamond Sand Co., Lake Wales, Fla., War, \$10,750

Boston Sand & Gravel Co., Greenbush, Scituate, Mass., War, \$35,500

Union Sand & Gravel Co., Spokane, Wash., War, \$19,400

Lake Sand Corp., Chicago, Ill., WPA, \$27,160

Jahncke Service, Inc., New Orleans, La., WPA, \$24,480

Jahncke Service, Inc., New Orleans, La., WPA, \$10,530

Crushed Stone

†Estimated

Federal Materials Co., Cape Girardeau, Mo., War, \$11,900

*Florida Crushed Stone Co., Leesburg, Fla., War, \$26,400

The Solvay Process Co., Jamesville, N. Y., WPA, \$11,098

Granite Rock Co., Watsonville, Calif., WPA, \$58,437

The Cleveland Quarries Co., Amherst, Ohio, War, \$13,936

New York Trap Rock Corp., Haverstraw, Verplanck, Tomkins Cove, and Clinton Point, N. Y., WPA, \$56,873

Federal Materials Co., Cape Girardeau, Mo., War, \$11,690

Graham Bros., Inc., Los Angeles, Calif., WPA, \$26,072

O'Connor Bros., Dartmouth, Mass., War, \$40,000

Slag

The Buffalo Slag Co., Inc., Lackawanna and Tonawanda, N. Y., WPA, \$19,750

Concrete Pipe

U. S. Concrete Pipe Co., Cleveland, Ohio, War, \$74,379

U. S. Concrete Pipe Co., Cleveland, Ohio, War, \$26,739

U. S. Concrete Pipe Co., Cleveland, Ohio, War, \$64,315

Sherman Concrete Pipe Co., Tampa, Fla., War, \$11,285

Ready Mixed Concrete

*Indefinite

*The Moraine Gravel & Sand Co., Dayton, Ohio

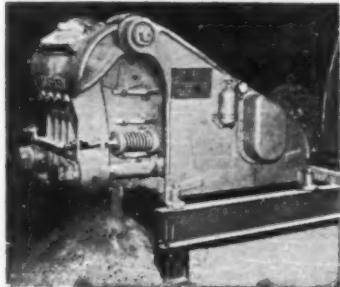
Phosphate

Swift & Co., (Fertilizer Works), Agricola, Fla., Treas., \$10,200

The Phosphate Mining Co., Nichols, Fla., Treas., \$94,500

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COLMONOY is the easiest of all hard-surfacing alloys to apply. There is a grade for every hard surfacing requirement. Use COLMONOY to recondition worn conveyor screws, gudgeons, pulverizing hammers, clinker plows, crusher teeth, feeder sprockets, etc.

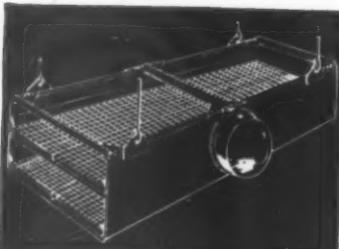
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Traffic and Transportation

PROPOSED RATE CHANGES—The following are the latest proposed changes in freight rates up to and including the week of November 22:

Southwestern

25727. Lime, from Portland, Colo., to points in Texas. To cancel Item 1070 of S. W. L. Tariff 14-T. Class or combination rates to apply.

25750. Feldspar, Divide, Manitou, Rollinsville, Salida, Tolland and Buena Vista, Colo., to Waco, Tex. To establish commodity rates on feldspar, carloads, min. wt. 80,000 lb., to Waco, Tex., of \$6.73 a ton from Divide, Manitou, Rollinsville, Salida, and Tolland, Colo., and of \$7.00 a ton from Buena Vista, Colo.

26140. Talc (hydrous magnesium silicate). Transit privileges on at Tulsa, Okla. To establish transit privileges on talc (hydrous magnesium silicate), C. L., at Tulsa, Okla., from Los Angeles, Cal., to destinations in Arkansas, Louisiana, Missouri, Oklahoma, also points in Mississippi Valley, Southeastern and Carolina territories.

26144. Agricultural limestone, between points in Missouri. To apply on agricultural limestone in open top equipment the same rates as apply on crushed stone between points in Missouri.

26255 (1). Light weight aggregates, Farwell, Tex., and intermediate Texas origins to interstate destinations. It is proposed to establish a maxima from Farwell, Texas, and intermediate origins on volcanic debris consisting of dirty pumice, sand, gravel, etc., to interstate destinations, rates based on the distance scale in Item 800, S. W. L. Tariff 162-Q from San Antonio, New Mexico.

26280. Crushed stone, also riprap, Stringtown, Okla., to Supply, Okla. To cancel the present weight of 100,000 lb. in Item 1140A, S. W. L. Tariff 162Q, in connection with rate of 14c net ton on crushed stone, etc., from Stringtown, Okla., to Supply, Okla., permitting the min. wt. in Item 60 to apply.

26344. Gypsum, crude or crushed, Southwestern producing points, to Nashville and Cowan, Tenn. To establish the following rates in cents per ton of 2000 lb. on gypsum, crude or crushed (not ground), in bulk, C. L., min. wt. 80,000 lb.:

From	To	Nashville, Tenn.	Cowan, Tenn.
Murfreesboro, Ark.	380	400	
Highland, Ark.	380	400	
Bucher, Okla.	480	500	
Gyp, Okla.	500	520	
Ideal, Okla.	500	520	
El Dorado, Okla.	520	540	
Southard, Okla.	500	520	
Watonga, Okla.	480	500	
Acme, Tex.	520	520	
Gypmine, Tex.	580	600	
Plasterco, Tex.	540	540	
Plasterco Jct., Tex.	540	540	
Rotan, Tex.	540	560	
Sweetwater, Tex.	540	540	

26351. Slag, Thomas, Ala., to New Iberia, La. To include New Iberia, La., among the points of destination in Item 3030A, S. W. L. Tariff 114J.

26357. Clay or sand, Charleston, W. Va., and Group, to Rio Grande crossings, for export to Mexico. To establish rate of 55c per 100 lb. on clay or sand, processed

for decolorizing, filtering or water softening, C. L., min. wt. 70,000 lb., from Charleston, W. Va., and Group, viz.: Owens, South Ruffner, Charleston, Elk and South Charleston, W. Va., to Rio Grande crossings, viz.: Presidio, Brownsville, Eagle Pass, El Paso and Laredo, Tex., on traffic for export to Mexico.

26359. Feldspar, Tabernash, Colo., to Bastrop and Shreveport, La. To establish same rates and min. wt. as applicable from Rollinsville and Tolland, Colo., contained in Item 2230A, W. T. L. Tariff 122L, I. C. C. A3349, on feldspar, C. L., to Bastrop and Shreveport, La.

Central

62298. Stone, viz.: Broken, rubble, riprap, quarry scrap and crushed stone screenings. Cancel all rates published in N. Y. C. Trf. 1902, from St. Paul, Ind., to destinations in Ill., Ind., Ohio and Mich., account obsolete, and similar rates in other individual lines' tariffs.

EXHIBIT B (Representative Points)

To	(1)	(2)
Richmond, Ind.	259	281
Ann Arbor, Mich.	325	325
Cadillac, Mich.	358	347
Cassopolis, Mich.	281	270
Flint, Mich.	347	336
Grand Rapids, Mich.	314	303
Grand Haven, Mich.	314	303
Lansing, Mich.	325	314
Lapeer, Mich.	358	347
Muskegon, Mich.	314	303
Saginaw, Mich.	347	347
Chillicothe, O.	314	325
Findlay, O.	314	314
Ironton, O.	336	356
Lima, O.	303	303
Massillon, O.	358	369
Painesville, O.	369	380
Springfield, O.	292	314
Zanesville, O.	347	347
Erie, Pa.	413	424

(1) Proposed rates from Valmeyer, Ill.
(2) Proposed rates from Hannibal, Mo., and Quincy, Ill.

(Continued on page 97)

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason. No present or prospective movement.

Note 5—Reason: Comparable with rates from other origins in immediate vicinity.

Note 6—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

Note 7—The oil, tar or asphaltum not to exceed 10% of weight of the commodity shipped, the shipper to so certify on shipping order or bill of lading.

ROCK PRODUCTS



Pictured above is a very simple scheme for storing and reclaiming surplus output by operating a small Sauerman Power Scraper on a long sloping pile between two masts, set up on open space alongside screening plant.



This picture shows how a Sauerman Slackline Cableway digs a large, deep pit and lifts material to top of screening plant in a straightline at a cost of just a few cents per yard. A sturdy machine that runs 24 hours a day, if necessary, with little attention.

GRAVEL, sand, crushed rock and other loose materials can be moved from pits, banks or stockpiles most cheaply with a Sauerman Drag Scraper or Cableway machine.

There is a double saving when you use a Sauerman machine. You keep down your equipment investment and your daily operating expense is lower than with any other equipment able to dig and haul an equal yardage. One man handles the entire operation. Capacities range from 10 to 1000 cu. yd. per hour.

Several interesting booklets have just been published showing just how various material-handling problems are solved with Sauerman machines. Write for these booklets today.

SAUERMAN BROS., INC.
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Sauerman LONG RANGE MACHINES

OSGOOD



TYPE 80 AIR CONTROL

The leader of them ALL for smooth, fast and efficient shovel, dragline or crane operation.

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Produces Greater Profits For You!

Many satisfied customers operating these machines report production of 80 to 100 eight inch blocks per hour. This capacity with minimum investment and operating cost yields maximum profits.

One purchaser has written off his investment in 16 months operation at two-tenths of a cent per block. This machine is now operating 16 hours a day and is in excellent condition.

Reduced depreciation results in a wider margin of profit.

CONCRETE TRANSPORT MIXER CO., INC.
630 ROSEDALE AVENUE
ST. LOUIS, MO.

FOR THE NATION'S DEFENSE

DIAMOND is making astonishingly prompt deliveries on jaw crushers, roll crushers, portable or stationary complete plants, screens, belt conveyors, portable cranes, portable melting kettles, etc.

Our large trained engineering personnel together with extensive manufacturing facilities enable us to make these prompt deliveries of DIAMOND equipment for highway, ordnance plants, airport, and other construction jobs requiring crushed stone and aggregate. DIAMOND plants this year, have been playing an important part in this defense work the country over.

WRITE US TODAY

for bulletins or detailed information and prices on any rock, sand, and gravel crushing, screening, or conveying equipment.

DIAMOND IRON WORKS, INC.
and
MAHR MANUFACTURING COMPANY DIV.
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NEW EQUIPMENT means LOWER COST DIGGING!



Why cling to that old shovel? Why rob your profits to pay repair bills? The exclusive rolled alloy steel construction of P&H excavators means more dependability, greater production—and extra strength to resist the wear and tear of year-after-year operation.

Ask also about P&H's new hydraulic control. It's simpler, more positive and as smooth as steam!

Capacities from $\frac{1}{2}$ to 5 cu. yds. Gasoline, Diesel, electric power. Literature available on all models.

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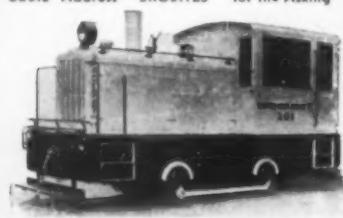


—that's what a Davenport Locomotive means to you. Your engineers will approve every modern detail of these outstanding power units. Your operators will enthuse over their flexible, smooth performance and easy handling. Your profit sheet will prove that you have made a good buy. Submit your requirements for free recommendations.

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DAVENPORT LOCOMOTIVE WORKS
A DIVISION OF DAVENPORT BESLER CORPORATION, DAVENPORT, IOWA

THE SCREEN THAT MINIMIZES CLOGGING



Why put up with clogging? You can eliminate it by equipping your vibrating and shaking screens with Hendrick Perforated Plate. The full clearance prevents clogging—and gives finer, lower-cost screening.

Hendrick Perforated Plate for vibrating and shaking screens is available in practically any size or shape of opening, in high carbon, heat treated steel highly resistant to abrasion.

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Makers of Elevator Buckets of all types, Mitee Open Steel Floorings, Mitee Shur-Site Treads and Mitee Armorgrids. Light and Heavy Steel Plate Construction.

McLANAHAN EQUIPMENT for ROCK—SAND—GRAVEL

Single and double roll and jaw crushers, hammer mills, super dry pans, steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists. Complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.

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Corporation
Established 1835
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SAVE STEEL FOR NATIONAL DEFENSE

WELD
Jaw Plates, Gyratory and Roll
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11 to 13½% Manganese Nickel Steel

WELDING ELECTRODES, WEDGE and
APPLICATOR BARS, HOT ROLLED PLATES

STULZ - SICKLES CO. Sole Producers Newark, N. J.
Sold Thru Distributors Only

ROCK PRODUCTS

Transportation and Traffic

(Continued from page 94)

68870. Lime, common, hydrated, quick or slaked, C. L., in bags, barrels, casks, iron drums or in bulk. Established on, from Hannibal, Mo., Quincy and Marblehead, Ill., to Trafford, Penn., 25c, min. wt. 30,000 lb. and 20c, min. wt. 50,000 lb.

68882. Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica) and gravel, in open top cars (See Note 3); also on slag, crushed or crushed commercial (the product of iron and steel furnaces), in bulk, in open top cars (See Note 3). Establish on, from Hamilton, O., to C. & O. Ry. stations, viz: Ross, Oneonta, Dam No. 35, New Richmond, California, Beagle, Mentor, Ivor, Cartown, Foster, Ky., 110c; Willow Grove, Bradford, Weisburg, Rock Springs, Augusta, Higginport, Dover, Ky., 121c; South Ripley, Duke, Ausanba and Maysville, Ky., 132c per net ton.

68907. Fluor spar, C. L., in packages or in bulk, min. wt. 40,000 lb. Establish on, to Haydenville, O., from Illinois Mines shown below and Evansville, Ind., viz.: Brookport, Golconda, Homer, Metropolis, Ill., Evansville, Ind., 545c; Cochran's Spur, Eichorn, Rosiclare and Stewart, Ill., 578c per net ton.

68913. Sand, all kinds, and gravel, in open top cars, C. L. (See Note 3). Establish on, from Toledo, O., to Carrollton, O., 149c; Dalton, O., 127c, and Milan, O., 99c per net ton.

68914. Industrial sand, as per usual descriptions (a), (b) and (c). Establish on, from East Liverpool, O., to Tamms, Ill., (a) and (b) 374c; (c) 411c per net ton.

68871. Brucite and dolomite combined (calcined or dead burned), C. L., min. wt. 60,000 lb. Establish on, from Nario, O., to Laredo, Tex., for export to Monterey, N. L., Mex., 44c.

Western

E-41-484. Gypsum rock, mine run or crushed, not ground, C. L. (See Note 3), but not less than 60,000 lb., from Medicine Lodge and Sun City, Kans., to Yellow Springs, Ohio. Rates: Present—E. St. Louis combination of 18c to E. St. Louis in Item 417D, W. T. L. Tariff 352C plus 22c beyond per Item 8150 of C. F. A. Tariffs 138 and 484. Proposed—21c per 100 lb. (By shipper.)

E-41-485. Sand, gravel and stone, crushed, etc., from, to and between points in Nebraska on intrastate traffic involving two or more lines. Proposed, (a) establish in WTL Tariff 175-A (Nebraska intrastate only), a rule to permit the use of the aggregate of intermediate rates in connection with shipments of 10 cars or more where such rates make lower charges per car than the joint line distance rates now published in Item 75 of the tariff. This rule to be referred to by reference mark against the distance rates up to and including 120 miles. (b) Establish an aggregate of intermediates rule in connection with rates published in Item 75, WTL Tariff 175-A.

E-41-486. Sand, gravel and stone, crushed, etc., from, to and between stations in Nebraska (single line) on intra-state traffic for distances not exceeding 120 miles. Minimum weight, present, ninety (90) per cent of marked capacity of car, except that when weight of shipment loaded to capacity of car is less than ninety (90) per cent of marked capacity of car, the actual weight, but in no case less than 40,000 lb., will apply. Proposed, marked capacity of car in connection with rates applicable to shipments in lots of 10 cars or more.

E-41-487. Gypsum rock, C. L. (See Note 3), but not less than 50,000 lb., from Blue Rapids and Irving, Kan., to Yellow Springs, O. Rates, present, 40c per 100 lb. Proposed, 21c per 100 lb. (By shipper.)

PULVERIZERS for the reduction of Cement Materials, Limestone, Agricultural Limestone, Fire Clay and All Dry, Refractory Materials.

Capacities: 1 to 60 tons per hour

Finenesses: 20 to 350 mesh

BRADLEY PULVERIZER CO.

ALLENTEWON, PENNA.

To Increase Capacities or Fineness of Present Grinding Plant—
To Reduce Power and Maintenance Costs—
To Insure an Absolutely Uniform Product—

Use the BRADLEY AIR SEPARATOR

What rate per hour? What weight per day?



The Feedoweight Gives the Answer

Feeding, proportioning and batching — entirely automatic. The result — finished products of uniform quality with minimum manufacturing costs. The FEEDOWEIGHT correctly and uniformly feeds material by weight. In addition, an automatic totalizer will give you the exact total weight of all material so fed. It is a machine of unexcelled accuracy. Eliminate guesswork in your plant.

Write today for bulletin 388.

MERRICK SCALE MFG. CO.

184 AUTUMN STREET
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THE ROSS FEEDER

Completely controls the flow of any size material from Storage Bins, Hoppers or Open-Dump Chutes to Crushers, Conveyors, Screens, etc.

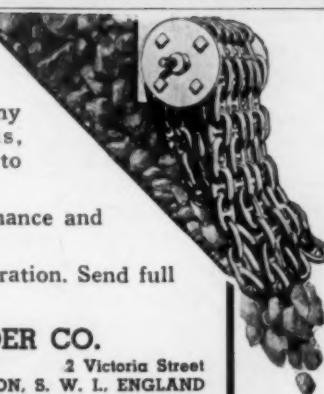
High in efficiency. Low in maintenance and power consumption.

Furnished in sizes to suit your operation. Send full particulars for recommendation.

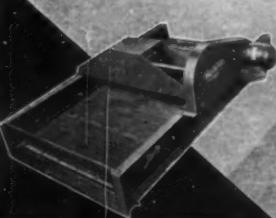
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Leahy HEAVY DUTY No-Blind VIBRATING SCREEN with TRI-VIBE —for Fine Mesh Screening



GUARANTEES PERFORMANCE with
No Screen Frame Breakage
No Tearing up Screen Cloth along the Sides
No Power Waste

Operates at full capacity and efficiency
with 1 H. P. motor
Write for Bulletin No. 14-H.

THE DEISTER CONCENTRATOR COMPANY

The Original Deister Co., Est. 1906

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A New High Degree of Crushing Efficiency



More production — more profit — lower operating and maintenance costs. All these are features of DIXIE performance.

Simple in design, yet sturdy in construction, DIXIE NON-CLOG and regular Stationary Breakers are unequalled for primary, secondary or fine reduction. Note particularly the continually moving breaker plate which means that DIXIE Hammermills will outlast and out-perform any other type.

Write for complete details on DIXIE'S 40 sizes.

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ARE YOU A QUALIFIED Barber-Greene OPERATOR?



Qualified Operators of Barber-Greene

Mixers
Finishers
Bucket Loaders
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who successfully apply are registered by the B-G Service Department and receive a Certificate and watch fob medallion engraved with the operator's name and machine he operates. (300 hours required minimum.)

We file registrations so as to serve machine owners who want operators, or operators who are not employed.

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If you have had over 300 hours operating experience on any of the above Barber-Greene, write for application form.

41-13

BARBER-GREENE
AURORA, ILLINOIS

OBITUARIES

ALEX J. DION, who for the past five years had charge of the New York office of the Allentown Portland Cement Co., in which organization he served faithfully for 37 years, died recently at the age of 56.

GEOFF A. SAEGER, general supervising chemist, Colorado Portland Cement Co., Denver, Colo., died of a heart attack, November 4, at Devil's Slide, Utah.

JAMES MARVIN DUDLEY, president of the Dudley Stone Products Co., Inc., El Paso, Texas, died recently at the age of 71. Mr. Dudley played a prominent part in the development of El Paso and surrounding area, doing contracting work in Texas, New Mexico, Arizona and Mexico, constructing Scenic Drive and supplying materials for Fort Bliss. Before coming to El Paso Mr. Dudley helped found the Dudley Construction Co., which built the Mexico and Northwestern railroad and other railway lines in Mexico.

J. CLYDE ARROWOOD, president of the J. Clyde Arrowood Cement & Pile Co., Lincolnton, N. C., died recently of a heart attack at the age of 53. Mr. Arrowood was also a partner with E. S. Schrum in the Star Lumber Co.

FRANK S. LASH, one of the owners and officials of Jackson & Church Co., Saginaw, Mich., died Nov. 11, 1941.

VIRGINI E. MAZZUCHELLI, treasurer of the Cambridge Cement Stone Co., Boston, Mass., passed away recently at the age of 54. Mr. Mazzucchelli was born in Samarate, Italy, and came to this country when he was 18. At the age of 29 he founded a partnership known as the Cambridge Ce-

ment Stone Co., in East Cambridge. By 1929 the firm, now incorporated and located in Brighton, had grown to be recognized as one of the largest manufacturers of cast stone.

ANDREW DESTIN, head of the building material firm of Alfred Destin Co., Miami, Fla., died recently at the age of 69, after a brief illness. A native of Destin, Fla., which was named after his family, Mr. Destin saw lighthouse service in Cuba during the construction of the Overseas railroad. In 1917, he came to Miami with his brother, Alfred, with whom he operated his business.

EDWIN STAND LUDWIG, died at his home in Gainesville, Fla., following a three month's illness. Mr. Ludwig was connected with Florida's phosphate industry for 46 years. His developments began in Alachua County many years ago, later extending to the South Florida area.

THOMAS C. L. NUGENT, president of the Nugent Sand Co., Inc., Louisville, Ky., died recently at the age of 62. Mr. Nugent, a native of Louisville and a graduate of duPont Manual Training High School, had been connected with the sand and gravel industry for many years.

JOSEPH MURPHY, founder of the Clinton Asphalt Co., Union City, N. J., and for over 50 years a leading figure in road construction in New Jersey and New York, died recently at the age of 82. Starting in business as Joseph Murphy & Son, Mr. Murphy some 23 years ago organized the Clinton Asphalt Co., of which he had since been president and principal stockholder. He had also organized the Clinton Road Oiling Co., the Suffern Stone Co., and the Highway Distributing Co. of New York, in all of which he was president and chief stockholder.

The TY-ROCK
FULL FLOATING
CIRCLE THROW
SCREEN

High Tonnages of Rock

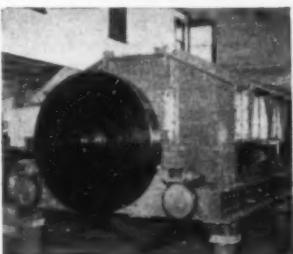
Course and Medium Sizes
Live Rubber Mountings
No Escaping Vibrations

The W. S. Tyler Company
CLEVELAND, OHIO, U.S.A.

ANOTHER

"PENNSYLVANIA" REVERSIBLE HAMMERMILL

ready to "go on the line" in a new Cement plant designed for top efficiency in every Department.



- Major crushing by smashing impact
- Automatic hammer turning
- Product sizing and wear compensation
- Assured by Duplex cage adjustment
- Reduced power demand
- Sharply cut maintenance cost

are some of the outstanding advantages which this REVERSIBLE Hammermill will provide in the Secondary Preparation for modern Raw Side Grinding Mills.

See our Bulletin No. 1030, and PUT YOUR REDUCTION PROBLEMS UP TO US.

PENNSYLVANIA
CRUSHER COMPANY

Liberty Trust Bldg.
PHILADELPHIA, PA.

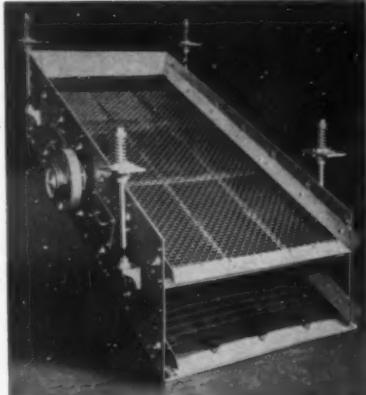


PERFORATED METAL SAND AND GRAVEL SCREENS

Manufactured exactly to your specifications
Any size or style screen, in thickness of steel
wanted with any size perforation desired.

We can promptly duplicate your present screens at lowest prices

CHICAGO PERFORATING CO.
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Denver - Dillon Vibrating Screen

The Denver-Dillon Vibrating Screen has been proved by over four years of service in numerous industries. Operators report definite reduction in screening costs. "Floating circle" principle requires less than half the horsepower of other means of screening. Write today for new Bulletin No. S3-B3.

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SUPER-LOY
WOVEN WIRE SCREENS
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RYERSON CERTIFIED STEELS

10 Strategically-Located Steel-Service Plants

Principal products include—Alloy Steels, Tool Steels, Stainless Steel, Hot Rolled Bars, Hoses and Bands, Beams, and Heavy Structural Channels, Angles, Tees, Zee Plates, Sheets, Cold Finished Shatting Bars, Screw Stock, Strip Steel, Flat Wire, Bolts, Tires, Mechanical Tubing, Rivets, Bolts, etc. Write for Stock List. Joseph T. Ryerson & Sons, Inc., Plants at Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.



USE RIGHT BUCKET FOR THE JOB

Hayward makes all four-clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.

THE HAYWARD COMPANY
202-204 Fulton Street
New York, N. Y.

Condor RUBBER PRODUCTS

HOSE

Air, Acid, Contractors, Fire, Hydraulic, Oil and Gasoline, Steam, Sand Blast, Suction, Water, Spray and Special Hose. 81 Kinds for 81 Uses.

OTHER PRODUCTS

Chute Lining, Molded Rubber Goods, Industrial Brake Blocks and Lining, Rubber Lined Tanks, Rubber Covered Rolls—Abrasive Wheels, Bowling Balls.

Keep Ahead with MANHATTAN

THE MANHATTAN RUBBER MFG. DIVISION
OF RAYBESTOS-MANHATTAN, INC.

111 Townsend St., Passaic, N. J.

WILFLEY centrifugal SAND PUMPS

for Slurries, Sand Tailings,
Slimes, Acid Sludges

Save Pumping Costs



Continuous operation without attention for long periods. Stuffing box, stuffing gland water ALL eliminated. Close clearances maintained by easy slippage seal adjustment. Heavy

pumping parts of material best suited for YOUR particular problem. Complete engineering service. Prompt shipment of parts. The most efficient and economical pump you can buy. Write for Complete Catalog

A. R. WILFLEY & SONS, Inc., Denver, Colo., U. S. A.
NEW YORK OFFICE: 1775 BROADWAY

FARREL BACON CRUSHERS

Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants.

Engineering Service

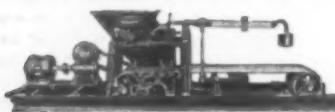


EARLE C. BACON, Inc.

17 John St., New York, N. Y.

A BLENDER A MIXER

and Unequalled In Its Exactness



The Automatic Feeder - Weigher - Conveyor

These efficient, accurate, economical weighing and feeding machines have proven their value to operators of cement mills, for accurately proportioning stone and clay—also clinker and gypsum by weight and not by volume.

Also being used for weighing and feeding materials to all types of Grinding Mills.

The Poidometer is self-contained. The scale beam is graduated in pounds or kilos, and can be set at whatever amount of material may be required per foot of belt travel; the gate is then adjusted to suit this weight, and the machine will deliver the pre-determined amount of material with an accuracy of ninety-nine per cent.

Send for bulletin on the improved Poidometer with electrically operated regulating gate.

Write for Bulletin No. 2-A and get complete profit-producing facts!

Schaffer Poidometer Company
2028 Smallman Street PITTSBURGH, PA.

Manufacturers' News Notes

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced the election of Walter E. Hawkinson, treasurer, to the joint position of secretary-treasurer, assuming the secretarial duties of Wm. A. Thompson, vice-president and secretary, who resigned recently. Mr. Hawkinson started with Allis-Chalmers 34 years ago in the treasurer's department, and in the various positions he occupied since, he gained a wide knowledge of finance and management. Mr. Thompson's resignation terminates forty years of service, beginning as a general bookkeeper in the Accounting Department.

Diamond Iron Works, Inc., Minneapolis, Minn., has appointed The Power Equipment Co., Denver, Colo., as their dealer in the entire State of Colorado.

Johns-Manville Corp., New York, N. Y., announces that Frank W. Rowe, general purchasing agent for 23 years, is among the first to retire under the company's new retirement plan, which provides for a retirement income at the age of 65 for all employees on the regular payroll two or more years. Ninety-six percent of Johns-Manville employees eligible to participate have signed up. Mr. Rowe was an organizer of the Purchasing Agents Association of New York and a regional vice-president of the National Association of Purchasing Agents.

Fairbanks, Morse & Co., Beloit, Wis., has announced that they will build a new Diesel Engine plant devoted to the manufacture of Diesel engines for the United States Navy.

Stewart-Warner Corp., Alemite Division, Chicago, Ill., has announced the appointment of Huntington Eldridge as special oil company representative on the Pacific Coast.

General Electric Co., Schenectady, N. Y., has elected the following new vice-presidents: Walter R. G. Baker, Chester H. Lang, David C. Prince, Elmer D. Spicer, and Harry A. Winne.

Flexible Steel Lacing Co., Chicago, Ill., has appointed John F. Ramsey as factory sales representative for New York and the New England States.

The Babcock & Wilcox Tube Co., New York, N. Y., has announced that W. J. Thomas, who has spent nine years with the Process Equipment Division, has been transferred to the executive department of the sales offices of the company.

New Incorporations

Dales Concrete Corp., Bronx, N. Y., has been incorporated to engage in general building, with a capital of \$1000. David S. Elgot is the agent.

Milwaukee Limestone Products Co., Milwaukee, Wis., has been authorized to increase its stock from 400 shares at \$50 each to 1200 shares at \$50 each.

Central Ready-Mixed Concrete Co., Milwaukee, Wis., has been incorporated with a capital stock of 1250 shares, no par value. M. C. Kolinski, Texarkana, Texas, is the agent.

Vencon, Inc., Dover, Del., has been granted a charter to engage in the cement, asphalt and brick business, with a capital stock of 5000 shares, no par value. Incorporators are M. S. Cook, M. S. Storey and J. M. Townsend.

Marine Sand & Gravel Corp., Queens, N. Y., has been organized to deal in sand, gravel and stone, with a capital of \$5000. Schwartz & Bergman, Jamaica, N. Y., are the agents.

Black Dixie Mica Mining Corp., Spruce Pine, N. C., has received authorization to prospect, locate and mine any and all kinds of minerals. Capital stock \$10,000.

subscribed stock \$400. Incorporators are E. M. Shipp, Joe Mayberry, Bill Atkins and E. L. Briggs.

Sand-Lime Brick Production and Shipments

EIGHT active sand-lime block and brick plants reported for October and nine for September, statistics for which were published in November.

AVERAGE PRICE FOR OCTOBER		
	Plant Price	Delivered Price
Detroit, Mich.	\$16.00
Sebewaing, Mich.	10.50
Saginaw, Mich.	12.00
Seattle, Wash.	16.50
Mishawaka, Ind.	12.50
St. Louis, Mo.
Minneapolis, Minn.	9.00
Watertown, Mass.	12.50
		13.50

STATISTICS FOR SEPTEMBER AND OCTOBER

	September	October
Production	5,008,600***	4,220,150
Shipments (rail)	517,000	474,500
Shipments (truck)	3,809,642	3,538,306
Stock on Hand	1,199,525	1,954,605
Unfilled Orders	1,460,000	1,475,000

*Nine plants reporting: incomplete, one not reporting stock on hand and three not reporting unfilled orders.

**Eight plants reporting: incomplete, one not reporting stock on hand and two not reporting unfilled orders.

***Includes 95,000 double bricks.

Big Pipe Contract

MALONE CONCRETE PRODUCTS CO., Malone, N. Y., has been awarded a contract for 6540 lineal feet of reinforced concrete pipe to be furnished for an extension to the plant of the Aluminum Co. of America at Massena, N. Y. A building has been leased from the Malone Paper Co. to serve as a pipe manufacturing plant and machinery is being installed to fill the contract. The contract calls for 2460 ft. of 42-in. pipe and 4080 ft. of 30-in. pipe. The company, headed by Ray Perrigo, manufactures concrete pipe, block, brick and other products at Malone Junction.

Fireproof Office Replaces One Destroyed by Fire

THE DAIGLER SAND & GRAVEL CO., Inc., Williamsville, N. Y., recently had the misfortune to lose their office by a fire which was caused by a power line dropping on the building. To prevent another fire, the company immediately constructed a new fireproof office.

Buys Gravel Plant

J. E. MARTIN, formerly sales engineer for the Bowsman Washed Sand and Gravel Co., Troy, Ohio, has purchased a sand and gravel plant at Enon, Clark county, near Springfield, Ohio. Operation of the plant will be under the name of the Enon Washed Sand and Gravel Co.

Classified Advertisements

POSITIONS WANTED — POSITIONS VACANT
Set in six-point type. Minimum \$1.00 each insertion, payable in advance.

INFORMATION—Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, 30 inches to the page.

CLASSIFIED—Displayed or undisplayed. Rate per column inch, \$5.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

CONSOLIDATED CAN HELP YOU OVERCOME TODAY'S CONDITIONS

GYRATORY CRUSHERS

- 1—16" Telsmith.
- 1—15" Taylor Bulldog type.
- 1—20" Superior McCully.
- 1—27" Gates, with 100 H.P. A.C. motor.
- 1—No. 410-TZ Taylor, 10" feed, can be set to $\frac{1}{2}$ ".
- 1—2" Symons Cone Crusher, fine bowl.
- 3—Kennedy No. 19, No. 25, No. 49.
- 2—Telsmith Nos. 2-H and No. 3-F.
- 1—No. 40 Telsmith, 5" feed, $\frac{3}{4}$ " discharge; also No. 40 with 40 H.P. A.C. motor.

JAW CRUSHERS

- 48"x42" NERMCO; 24"x36" Allis-Chalmers; 9"x36" Wheeling; 15"x36" Universal; 18"x24" Blake; 15"x24" Pioneer; 10"x36" Farrell, and smaller sizes.

VIBRATING SCREENS

- 1—4"x14" SYMONS, DOUBLE DECK.
- 2—4"x7" Leahy, 2 deck, motor driven.
- 4—3"x5" Tyler Hammer, 2 deck, No. 31, enclosed.
- 2—4"x7" Jeffrey-Traylor, Type FB-4, 2 deck.
- 1—3"x7" Simplicity, 2 deck, motor driven.
- 1—3"x8" 3"x10" Niagara, 3 deck.
- 1—4"x8" Huron, 1 deck, V-belt drive.

2—8" x 12" ROD MILLS

Hardinge straight side Rod Mills, iron lined, Falk herringbone steel gears, Falk enclosed gear drive units, charge of rods with each mill. Arranged for peripheral or trunnion discharge. In excellent condition and for immediate shipment.

COAL PULVERIZERS

- 2—Erie City "Unitype" Size A, also Size C, with 60 H.P. motor.
- 4—4"x8" Kennedy; also 3"x6".
- 3—Foster Wheeler Size J, with 150 H.P. motors.
- 2—Riley "Arrow" Size G.
- 2—No. 55 Raymond "Imp" with 60 H.P. motors.

RAYMOND PULVERIZERS

- 2—4 roll HIGH SIDE, COMPLETE. Located Toledo. Must be removed by Nov. 10th. Priced accordingly.
- 2—2 roll HIGH SIDE, COMPLETE. Located Mobile, Ala.
- Nos. 0000, 00, 1 and 3, beater type. Also Nos. 55, 60, 90 "Imp" type.

ROTARY KILNS

- 5'x24', 7'x40', 6'x60', 7'6"x125'.
- ROTARY DRYERS, Direct Heat**
- Buggies-Cots, double shell: 5'x28', 5'x30', 6'x35', 5'6"x60', 30'x45'.
- Single Shell: 5'x30', 6x40, 6x50, 7x60.

LIME HYDRATORS

- Weber Sr. type, made by Arnold & Weigel with No. 1 Raymond Bros. Lime Separator; also Krizer. One Complete Hydrated Lime Plant.

BALL, ROD AND TUBE MILLS

- Ball Mills: 6x6, 6x8.
- Rod Mills: 4x8', 6x12. Hardings, straight side.
- Tube Mills: 2—5x20' Bonnot Co., silex lined.
- 1—5x22' Bonnot Co., silex lined.
- 6'x22', 2—6'x20' Smidt, silex lined.
- 5'x22', Allis-Chalmers, 5'x35' Vulcan, both iron lined.

HARDINGE CONICAL MILLS

- Silex lined: 4'x16", 5'x22", 6'x48", 8'x18", 8'x30".
- Iron lined: 3'x24", with classifier; 4'x16", 5'x22", 6'x22", 8'x18", 8'x30", 8'x36" with motor; 8'x48" with air classifier; 8'x48".

CONSOLIDATED PRODUCTS CO., INC.
15-16-17 PARK ROW Our Shops and Yard at Newark, N. J., cover eight acres.
NEW YORK, N. Y.

**IMMEDIATE SHIPMENT
LOW PRICES**

NEW RUBBER

**GUARANTEED
HIGH GRADE**

CONVEYOR and TRANSMISSION BELTING

CONVEYOR BELTING

ABRASIVE RESISTANT COVERS

Width	Ply	Top	Covers
48"	8	1/8"	—1/16"
42"	5	1/8"	—1/16"
36"	6	1/8"	—1/16"
30"	6	1/8"	—1/16"
30"	5	1/8"	—1/16"
24"	5	1/8"	—1/32"
24"	4	1/8"	—1/32"
20"	5	1/8"	—1/32"
20"	4	1/8"	—1/32"
18"	4	1/8"	—1/32"
16"	4	1/8"	—1/32"
14"	6	1/16"	—1/16"
12"	6	1/16"	—1/16"
12"	5	1/16"	—1/32"

TRANSMISSION BELTING HEAVY-DUTY— FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	3	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

ELEVATOR BELTING

HEAVY DUTY RUBBER COVERED

Width	Ply	Top	Covers
12"	6	1/16"	—1/16"
14"	6	1/16"	—1/16"
16"	6	1/16"	—1/16"
18"	6	1/16"	—1/16"

INQUIRE FOR PRICES :— MENTION SIZE AND LENGTHS

CARLYLE RUBBER CO., Inc.
62 PARK PLACE

1—1 $\frac{1}{4}$ Yd. Lima Shovel
1—1 $\frac{1}{4}$ Yd. Osgood Shovel
1—1 $\frac{1}{4}$ Yd. Northwest Shovel
1—1 $\frac{1}{4}$ Yd. Insley Full Revolving Shovel
1—High Pressure Triplex Road Pump
1—24" x 36" 14B Farrell Jaw Crusher
1—24" x 36" 15B Farrell Jaw Crusher
1—18" x 36" Farrell Jaw Crusher
1—15" x 30" Buchanan Jaw Crusher
1—10" x 20" Farrell Jaw Crusher
1—10" x 30" Farrell Jaw Crusher
1—14" x 36" Farrell Jaw Crusher
1—16" Taylor Gyratory Crusher
1—3" Taylor Gyratory Reduction Crusher
1—No. 40 Telsmith Gyratory Reduction Crusher
450' of 36" 7 Ply Conveyor Belt, New
300' of 30" 6 Ply Conveyor Belt, New
1—75 H.P. Slip-Ring Motor
1—12" Pump, Steel Hull, Electric Swintek Dredge

BLUE BALL MACHINE WORKS
BLUE BALL, PA.

BUCYRUS 15-20 ton cap. steam locomotive crane, 54" retubed boiler, 50' bm., std. ga., 8 whl., overhauled.
PLYMOUTH 35-ton gas locomotive, std. ga.; also 8 others, smaller, narrow gauge.
HUCYRUS 2-yd. 50B elec. shovels, on cats. (2).
Also 30B steam shovel on cats, high lift, 50' bm., 2½ yd. dipper.
MARION 3 yd. Model 70 steam shovel on cats.
BROWNMEAD portal gantry cranes (2) broad aisle type.
ALLIS-CHALMERS 12-K gyratory crusher.
AMERICAN Reboiler No. 685 broad gauge cranes (2), elec. & steam, 100' beams.
CLYDE steel 10-ton elec. guy derrick, 70' boom.
MONIGHAN Walker dragline ST, elec., 70' bm.
ALLIS-CHALMERS 54"x34" Anaconda type rolls.
BUCTRUS-EMERSON 1-1/2-yd. gas comb. shovel-crane; also gas air 1 1/2-yd. crane, 50' boom.
G.E. turbo-generator set, 750 KW a.e., 3-60-2300 v., 125 lbs. steam, complete, overhauled, A-1.

H. Y. SMITH CO. 828 N. Broadway Milwaukee, Wis.

FOR SALE Dredging Equipment

LOT 1: The Dredge "Chickasaw," 16" cutterhead electric powered dredge, 750 H. P. motor on main pump. All steel construction. Sectional type hull, may be completely dismantled for shipping by rail or boat. All new in January, 1941, with exception of nucleus-Erie machinery, which was completely rebuilt before installation. This dredge is complete in every respect and ready to be put to work now.

LOT 2: One 15" Booster Pump complete with 500 H.P. electric motor and controls.

LOT 3: 53 steel pontoons, 1,000' submarine cable, 1,000' power transmission line, complete with insulators, guy wires, etc.

This equipment is located at Memphis, Tennessee and may be inspected at any time.

J. B. MICHAEL & COMPANY
P.O. Box 850, Memphis, Tennessee

REBUILT TRUCK MIXERS FOR RENT OR SALE

All Sizes—With or Without Trucks
27E Multi-Foots Paver
Road Forms—Finishers

7—2 yd. Separate Engine Drive Truck Mixers, Mounted on Fords and Chevrolets, —Good Running Condition, Now Working, Immediate Delivery —
PRICE EACH\$1500.00

The Jaeger-Lembo Machine Corp.

CORONA, N. Y.
Phone: NEWtown 9-7777

DON'T WAIT IN THE PRIORITY LINE!



AIR COMPRESSORS

Portable and stationary, belt with elec. or gas power, sizes from 20 cu. ft. to 1,000 cu. ft.

BINS

8—1 150-ton Blaw Knox, 1 118-ton Blaw Knox, 1 117-ton Blaw Knox, 1 72-ton Blaw Knox, 1 51-ton Blaw Knox, 1 35-ton Blaw Knox, 2 20-ton Johnson. Above with or without weigh batchers. All of the above are 2 comp. bins.

CABLEWAYS

1—Lidgerwood 15 ton cap. cableway, 2300' span, with Lidgerwood 12x15 steel hoist, with or without steel towers.

CRANES, DRAGLINES AND SHOVELS

1—Link Belt K-55, ser. No. 1698, 70' boom, 2 yd. bucket, also have a 2 yd. shovel attachment.
1—Link Belt K-45, ser. No. 1724, 60' boom, 2 yd. bucket.
1—Northwest Model No. 5, Serial No. 3672, 50' boom with 1 1/4 yd. pull shovel attachment.
1—Link Belt model K-42, ser. No. 1265, 45' boom, 1 1/4 yd. bucket, also 1 yd. trench hoe att. or 1 1/4 yd. shovel front.
1—Northwest Model 104, ser. No. 2079, 45' boom, 1 1/4 yd. bucket; with 1 yd. shovel attachment.
3—Northwest Model No. 4's, Ser. No.'s 3441, 3445, 3493, with 40' boom and 1 yd. pull shovel attachments.
2—Northwest model 105, ser. No. 1645, 18x2, 40' boom, 1 yd. bucket.
3—Osgood Heavy Duty, ser. No. 2069, 2087 and 2403, 40' boom, 1 yd. bucket and with 1 yd. shovel attachment.

1119 S. Washtenaw Ave.
CHICAGO

30 Church St., Dept. RP
NEW YORK

1511 Race St.
PHILADELPHIA

P.O. Box 933, Dept. RP
PITTSBURGH

Self interest and patriotic duty both require that construction proceed without delay. No priorities are needed when you buy REBUILT AND REGUARANTEED equipment from E. C. A.

2—Erie gas-air ser. Nos. 4365 and 9758 with 45' boom and 1 1/4 yd. shovel attachment.

1—Thew 1/2 yd. gasoline shovel with 1/2 yd. shovel front and 40 ft. crane boom. Serial No. 2801.

1—Koehring Model 301, Ser. 544, 40' boom, 1/2 yd. bucket.

1—P&H Model 266, Ser. No. 1901, 1/2 yd., 40' boom.

1—Byers Bearcat Model No. 128, 1/2 yd. cap., ser. No. 4119 with 30' boom.

1—Byers Bearcat model 27, ser. No. 5289, 30' boom, 1/2 cu. yd. bucket.

1—Erie Steam Crane, 1/2 yd., 40' boom.

CRUSHERS

4—Jaw Crushers: 1—12'x20" Acme; 1—10'x20" Climax; 1—9'x16" Acme; 1—2'x6" Sturtevant.

3—Gyratory Crushers: 1—No. 5 Allis-Chalmers; 1—No. 6 Austin; 1—No. 0 Allis-Chalmers.

1—Crushing Rolls; Size 42"x16" Allis-Chalmers.

LOCOMOTIVES

20—Locomotives, gas, electric and steam. 2 to 20 tons, 24", 36" and standard ga.

PUMPS (DREDGE)

2—10" Morris Dredge pumps, 1 to direct connect to motor, other belt drive.

4—Belt driven: 3 Morris Mang., 1—8", 2—6"; 1—8" Cataract.

PNEUMATIC TOOLS

36—Rock Drills, mounting, wagon, column or tripod.

53—Jackhammers, various makes and sizes.

EQUIPMENT
CORPORATION
of
AMERICA.

Liquidation Sale

Equipment of the
Chester Valley Lime Co.

Glen Loch, Pa.

Consisting of

QUARRY, CRUSHER—24" gauge cars, 10 x 12 compressor, 4 1/2" Traylor and No. 5 Austin crushers, belt elevator 55 ft. centers, revolving screen 5' x 24", wood bins and gates.

KILNS—Steel tramway, Lidgerwood hoist 16' x 24" drum, 4 "Keystones" type kilns, 11 ft. D, 60 ft. high, 4 furnaces per kiln, 24" draw pan conveyor, 105 ft. horizontal, 55 ft. incline.

LUMP LIME—75 ton lime bin, 30° inclined picking conveyor 45 ft. long, hopper, 4 x 10 ft. shaking screen, Pennsylvania single roll crusher 18 x 24. Elevator, 40 ft. centers, 14" belt conveyor, 60 ft. long in gallery.

HYDRATOR—20 ton feed hopper, No. 6 Schultheiss Hydrator, capacity 5 to 6 tons per hour, 3 elevators, 24 ft., 34 ft. and 39 ft. centers, 10 ft. Sturtevant Classifier, 10' pulverizer, 100 ton packing bin.

MOTORS & STARTERS—3 ph., 60 cu. 410 V.

WARNER CO.

219 N. Broad St. Phila., Pa.

CONCRETE EQUIPMENT

Ready-Mix Blaw Knox concrete plant, complete, large size, splendid condition, unusual opportunity, specifications furnished.

Blaw Knox complete central mixing plant.

Holtz bin, 225 ton, 4 compacts, weigh batcher.

Blaw Knox complete central mixing plant.

Butler 100 yd. 2 bin, 2 bin weigh batcher.

Steel bin, 75 yds., single bin weigh batcher.

Resumon 42 yd. two compact bin.

200 ton rock storage bin, steel, heavy construction.

Fuller Kinney bulk cement unloader, portable.

Fuller C40 rotary air compressor, electric.

Ransome 28-8 1 yd. stationary mixer, etc.

Haus bucket loader, etc.

Barber Greene Model 62 bucket loader, etc.

SPECIALS!!!

Asphalt emulsion plant complete.

Steel stiff leg derrick, 15 tons, 100 ft. boom.

13" x 12" Lidgerwood 3 drum steam hoist.

20,000 lbs. oil tanks with heating coils.

42" x 48" Taylor Rock Crusher.

1. R. Air Compressor, 310 cu. ft., gas, portable.

1—**STEEL SKIPS—STONE SKIPS**

22—Steel skips, 2 to 20 yds.

1 1/2 yd. heavy duty Blaw Knox digging bucket.

1 1/2 yd. heavy duty Blaw Knox digging, clamshell.

1 1/2 yd. Hayward rehandling clamshell.

1/2 yd. Haus rehandling, clamshell.

1 yd. Hayward orange peel, 4 leaf.

1/2 yd. Hayward orange peel, 3 leaf.

SHOVELS—CRANES

Marion Model 125 Elec. Shovel, 3 1/2 yds.

2—Marion Steam shovels, 1 1/2 yd. cap.

2—Marion Steam shovel, 1 1/2 yd. capacity.

No. 50-B Bucyrus Erie electric shovel, 2 yds.

Northwest Model 105 1/2 yd. vd. gas crane.

Northwest 1 1/2 yd. gas crane, 60' boom.

Lima Model 101 comb. shovel-crane, 1 1/2 yds.

Marion Steam Shovel, 1 1/2 yd. capacity.

Ind. Brownhoist loess, crane, electric, 20 tons.

Browning loess crane, 25 tons, steam.

LOCOMOTIVES-CARS

2—Vulcan 6 ton, gas, 36" gauge.

2—Whitecomb 4 1/2 ton, gas, standard gauge.

8—3 yds. V type 20' x 20' side dump cars.

CRUSHERS

Gyratory crushers: K.V.S. 30, 37-S, 49; Teismith

32, 38, 48; Taylor 8"; McCully 13", 8", 6".

Jaw: 6x12, 9x18, 10x20, 12x28, 13x30, 15x30.

16x22, 36x48, 48x60.

Symons 4" cone crusher, complete.

RICHARD P. WALSH CO.

39 CHURCH STREET NEW YORK

LIQUIDATION

1—Rotary Kiln or Dryer 8' x 90', 1/2" shell
1—5 1/2' x 50' Rotary Dryer
1—Blaw-Knox 6' x 12' New Ball Mill, Motor Driven

2—Ball Mills 7' x 10', motor driven
2—Steel Stacks 5'6" x 86' high
2—Belt Conveyors 16" x 50' and 56"

6—Gould Pyramid Pumps 2" to 4"

1—Allis Chalmers 5' x 22' Compel Mill

5—Rotary Dryers 2' x 12', 3' x 11', 56" x 30', 6' x 40', 8' x 80'

2—Jeffrey Hammer Mills 24" x 20", 24" x 18"

1—Link Belt 3' x 8', 2 deck Vibrating Screen

1—Tyr-Hummer 3' x 5', 3 deck Vibrating Screen

2—Sutton, Steele and Steele Pneumatic Tables

1—No. 6 Diester Concentration Table

1—Allis Chalmers 9" x 15" Jaw Crusher

1—Plymouth Gasoline Locomotive 6 ton, 36" gauge.

4—Williams, Gruendler Hammer Mills

BRILL Equipment Corporation
183 Varick St.
New York City

FOR SALE OR RENT

1—No. 5 and No. 6 Northwest Cranes

1—Model 104 Northwest Crane

1—Model 3 Northwest Crane

1—Model 45 Bay City Crane

2—1/2 yd. Koehring Cranes

3—160 ft. 2 stage Port. Air Compressors

6—Double drum gasoline hoists

2—8 1/2 x 10 three drum steam Hoists

3—Independent Steam Swinging Engines

1—301 Koehring Shovel Front

MERTES MACHINERY CO.
1692 So. First St.
Milwaukee, Wisconsin

ROCK PRODUCTS

CRUSHERS

GYRATORY: 42" Gates K. 30" Superior McCully (Like new). 20" Superior McCully. Gates Nos. 12, 10, 9, 8, 7½, 6, 5, 4, 3, 2, 1 (75 avail.) Tele-swing No. 4, 3, 2, 1 & 16. Many Austin Kennedy and Taylors, many sizes.

JAW TYPE: Taylor 60x24, 48x60, 42x48, 24x72. Superior 54x36 & 24x36. Buchanan 30x42. Farrel 60x24, 30x36, 24x36, 18x36, 12x24. Good Roads 1020. Acmo 24x36. Miles 7x12, 9x12, 8x30, 8x24. 12x24.

REDUC. TYPE: Kennedy Nos. 25, 37 & 49. Telsmith 3-F & 40. Taylor 38" TZ, 8", 10", 12". Super. McCully 6" & 10". Newhouse 5, 7 & 10". Symons Cone & Disc Ty. 2" to 4".

ROLLS: Allis-C. 12½x12, 36x10, 48x18, 54x24 & 72x24. Fairbanks 30x36, 24x36, 24x24 & 36x36. Allis-Chalmers 36x14 & 42x18. Etc. Etc.

HAMMERMILLS: Williams Nos. 1, 2, 3, 4, 5 & 6. Jeffrey 36x18 & 36x22. Day Nos. 20 & 40. Etc.

MILLS: Kennedy Ball 4x6, 5x6 & 5x8. Marcy 8x6 & 10x9. Hardings 6x10, 8x20 & 6x18. Misc. Tube Mills, 6" & 6" Sturtevant Ring Roll. Raymond, Kenne, Fullerton, Ladd, Etc., Etc.

CRUSHING PLANTS: No. 65 Diamond No. 22 Pioneer 8x24, 10x20. Good Roads, 9x40 Austin-Western, 9x36 C.R.

MISCELLANEOUS ITEMS

Bargee, Blis, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryer, Derricks, Draglines, Drag Scrapers, Dredges, Drills, Engines, Elevators, Excavators, Generators, Hoists, Kilns, Locomotives, Loaders, Motors, Pipe Pumps, Rail Scales, Screens, Shackson, Shovels, Tanks, Trucks, Tractors, Etc. Many sizes & types can be made at low prices. (I have equipment in many points in the United States and Canada. What you need may be near your plant.)

ALEXANDER T. MCLEOD
7229 Rogers Avenue CHICAGO

LOCOMOTIVES SHOVELS — CRANES CARS

1—67 ton Porter 6-wheel Saddle tank, A.S.M.E. Boiler. Overhauled.
2—38 ton Vulcan 4-wheel Saddle Tanks, A.S.M.E. Boilers, Overhauled.
1—22 ton Porter 4-wheel Saddle Tank, Overhauled.
2—79 ton American 0-6-0 separate tender switchers, completely overhauled. I. C. C. condition. Built 1923.
1—17½ ton Brownhoist Locomotive Crane, Overhauled. New A.S.M.E. Boiler.
Crane or Dragline Fronts for Marion 37 and Bucyrus 50-B, One Each.
1—1½ Yd. Rehandling Clamshell Bucket, Practically New.

Birmingham Rail & Locomotive Co.
BIRMINGHAM, ALABAMA

NEED DUMP CARS? Immediate Delivery
7. 30-yd. Western 24. 16-yd. Western
10. 24-yd. Koppel 15. 16-yd. Kilbourne
15. 20-yd. Koppel 15. 16-yd. Jacobs
7. 30-yd. Western 2. 12-yd. Western
Illustrated specifications available

OTHER TYPES OF CARS TOO
Also Automobiles, Cranes, Shovels, Etc.

IRON & STEEL PRODUCTS, Inc.
13402 S. Brainerd Ave., Chicago, Illinois
"ANYTHING containing IRON or STEEL"

PROMPT DELIVERY

7" Newhouse Gyratory—60 HP Motor.
30 ton Plymouth 4½" Gas. Loco.
100-120-200-300-500-800 HP Diesels.
No. 10 Fairbanks 12x18. 12x24. 12x36. Drag.
No. 3 Northwest 2½ yd. Shovel-Crane-Drag.
20/25 ton Locomotive Cranes. Gaso-Elec. Steam.

MISSISSIPPI VALLEY EQUIPMENT CO.
518 Locust St. St. Louis, Mo.
Send Us Your Inquiries!

FOR SALE

Miles Tamper and Face Down Block Machine with all attachments and pallets; also 850 45% cast iron Miles Stripper pallets.

Battle Creek Concrete Products Co.
Battle Creek, Michigan

FOR SALE

One (1) 150 H.P. Thomas Single Drum Electric Hoist. Drum 60" Dia., 36" Face, Grooved for 1" Cable, 8" Shaft, Brake Drum 67½" Dia., 9" Face—G.E. Emergency Brake, G.E. Slip Ring Motor, 150 H.P., 3 Ph., 60 C., 440 V., 720 R.P.M. Serial No. 5196349 with electric drum controller, disconnect switch, magnetic contactors and resistor bank all mounted on one frame 76" x 13'6". Condition same as new.

Available February 1, 1942
One (1) 100 H.P. Flory Single Drum Hoist. Drum 48" Dia., 45" Face, grooved for ¾" Cable, 4¾" Shaft, with Faux 9-D-A Reducer, 870 R.P.M. Ratio 11.5 to 1, and Westinghouse 100 H.P. Motor, 870 R.P.M., 60 C., 440 V., 3 Ph. A-1 Condition.

Three (3) 10 Ton Plymouth Gas Locomotives. 36" Ga., Type 6, Model DLC. Condition A-1.

(22) 4 Yard Koppel Rocker Dump Cars—Condition Good.

(22) 4 Yard Rocker Dump Cars—Condition Good.

8000 Feet 36 lb. Rail and 16 Frogs and Switches. Condition Good.

One (1) 36" x 12' Stephens Adamson Company Apron Feeder, Style D.

Thomasville Stone & Lime Co.

Thomasville, Penna.

FOR SALE

1—½ yd. P&H Gas Crawler Crane—50' Boom.

1—½ yd. P&H Gas Crawler Shovel.

2—½ yd. Byers "70" Crane—Dragline—Shovel & Backhoe attachment.

1—Lorain 1 yd. Combination Crane—Shovel & Dragline—50' boom.

1—Blaw-Knox 3½ yd. Truck Mixer—1 with truck.

2—Int. TD-40 wide gauge Diesel Tractor—Garwood Bulldozer with Winch & 6" wheel Bucyrus-Erie Scraper Wagon.

1—CAT "35" with new BRO'S Bulldozer.

1—Int. T20 Gas Crawler Tractor—Bucyrus-Erie Bulldozer or single drum rear end logging winch.

1—100 ton 3 comp. portable Steel Bin—1 yd. weighbatcher.

2—Int. FM 2 portable Wagon Drills

1—360 ft. Chicago Pneumatic Portable Compressor.

1—10 ft. Sullivan Portable Compressor.

1—No. 50 I.R. Drill Sharpener.

1—No. 33 I.R. Drill Sharpener.

1—No. 50 I.R. Oil Furnace for No. 50 Drill Sharpener.

3—6" Marlow S.P.C. Cent. Pumps—Gas & Elec. power (Marlow)

SERVICE SUPPLY CORP.

20th & Venango Sts., Philadelphia, Penna.

30x30, 36x16 Taylor; 54x24 A.C. dbl. roll Crushers. 2 Symons Cone Coarse or Fine bowl, fine. 8x12, 10x12, 12x16, 14x18, 18x20, 22x24 Cedar Rapids; 10x12, 11x22, 13x26. Amse Jaw Crushers; 20x10, 36x16 Farrel Jaw Crushers.

19. 258 & 37 Kennedy; No. 7, 9, 10 & McCully.

17x40" Buggie Cold Direct Heat Dryer.

7x10 ft. Koppel 36" Ga. Heavy Duty Quarry Cars.

Barley Grinders, 24", 30", 42 & 60 A.

4x5" Hammer est. diec. Vib. Sceens & Generator.

70 ton Lima Shay std. ga. Locomotive. Rebuilt.

Shovels, Cranes, Screens, Conveyors, Elevators.

What do you need? Ask for Bulletins Nos. 54 & 55.

MD-CONTINENT EQUIPMENT CO.

710 Eastgate Pa. 2290 St. Louis, Mo.

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BINS

1—All steel twelve hundred ton, three compartment.

CARS

19—12 yd. capacity all steel 36" gauge air dump cars, air brakes with cast steel side truck frames.

2—4 yd. 36" gauge Koppel all steel rocker dump cars.

LOCOMOTIVE CRANE

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1—Pennsylvania 6 x 8 belt drive, capacity 75 cu. ft.

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All standard makes. Size No. 4 openings 8 x 30 up to Size 21 openings 42 x 134".

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8 x 16 up to and including 48 x 60.

SINGLE ROLL CRUSHER

1—24 x 24 all steel.

CRUSHING PLANT

1—Complete crushing plant with 24 x 36 crusher, 3 ft. finishing crusher, screens, conveyors, bins and all electrical equipment.

CRUSHING ROLLS

1—Set Buchanan 14" face, 30" diameter.

1—Set Buchanan all steel, 30" face, 48" diameter.

1—Set Sturtevant 10" face, 21" diameter.

CRUSHER SPECIALS

1—Symons 2" cone crusher, coarse bowl.

1—Kennedy No. 19 reduction crusher with 30 HP motor.

1—Kennedy Model 25 reduction crusher.

1—Traylor 3" finishing crusher.

1—Traylor 16" gyratory crusher.

1—24 x 24 Rock Jaw crusher.

1—Cedar Rapids 15 x 36 and one 8 x 36.

DRAGLINE BUCKET

1—Sauerman 1 yd. capacity dragline bucket with carrier equipment.

GUY DERRICK

1—30 ton capacity, 180° mast, 85' boom all steel, complete with guyas.

DYERS

1—8'6" x 36' double shell.

1—7' x 55' Allis Chalmers heavy duty single shell.

1—5' x 60' Traylor single shell.

2—6' x 40'.

DIESEL ENGINE GENERATOR SET

1—150 H.P., 4 cylinder, 4 cycle, solid injection, 225 RPM, with or without 300 KW AC generator.

HOISTS

1—Sullivan electric dragscraper or sluicing hoist, double drums, 60 H.P., 440-2300 volt.

1—Sauerman steam slackline or cableway hoist cylinders, 10 x 12.

1—Sauerman double drum dragscraper hoist, electric, 75 H.P., 440 volt AC.

HOISTS MINE TYPE

1—Single drum, 78" dia., 72" face, with 350 H.P. motor, 2200 volt, complete with all equipment.

1—4" dia. by 72" face with 150 H.P., 2200 volt AC motor and controllers.

1—80" dia. by 60" face with 200 H.P. motor, 2200 volt with all control equipment.

HOIST AND DERRICK

1—3 drum electric hoist with swinger, with steel stiff leg derrick, 75' boom, with or without one yd. clamshell bucket.

LOCOMOTIVES STEAM

1—Vulcan 60 ton six wheel saddle tank, code boiler, air brakes, electric lights, std. gauge.

1—Porter 50 ton 4 wheel std. gauge saddle tank, air brakes.

2—Vulcan 32 ton 4 wheel std. gauge saddle tank, air brakes.

1—Vulcan 21 ton steam air brakes, std. gauge.

LOCOMOTIVES GAS

1—Plymouth and 1 Vulcan 8 ton std. gauge.

2—Plymouth 20 ton and 24 ton std. gauge.

LOCOMOTIVES NARROW GAUGE

2—45 ton Heisler geared locomotives, 36" gauge.

1—Plymouth 7 ton, 36" gauge.

1—Vulcan 14 ton, 36" gauge.

1—Plymouth 8 ton, 36" gauge.

1—Plymouth 4 ton, 24" gauge.

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2—Log washers Allis Chalmers, 25' long, complete with metal boxes.

PULVERIZERS

1—Ball mill, 4' dia., 4' long.

2—Raymond large capacity pulverizers with integral exhaust and cyclone collectors.

1—Sturtevant No. 9 Ring Roll Mill.

SCREENS

2—4' x 10' double deck heavy duty scalping screens, V belt drive.

SHOVELS

1—Marion model 32 steam, 1½ yd. capacity, excellent condition.

1—Model 27 1½ yd. steam.

1—Model 27 1½ yd. steam.

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USED — GRUENDLER No. 2 Monster Limestone Pulverizer, 4 to 5 tons per hour.

USED — No. 7 MITTS & Merrell Wool Hog, plain bearing, 14" x 14" hopper opening, capacity 5 tons per hour.

USED — 30" LIPPMANN Portable Limestone Pulverizer, 14" x 14" hopper opening, in excellent condition.

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50, 60, 100 HP Elec. Hoists

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6—10,000 gal. Tanks

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One 22 foot dipper handle for Marion Type 37 Electric Shovel. Must be in good condition. Give price and location for inspection in reply.

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One Vertical Electric Motor, High Torque, 125 to 150 H.P., 220 V., 3 ph., 60 cy., slow speed. State condition, price and location for inspection.

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2 or 3 cu. yd. Sauermaier Cable Way Dragline, in good condition, powered by diesel or gasoline. Give full particulars and state price and location in reply.

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Index to Advertisers

Allis-Chalmers Mfg. Co....	3	9
American Cable Div.....		
.....Inside Back Cover		
American Chain & Cable Co., Inc.Inside Back Cover		
American Pulverizer Co....	85	
American Steel & Wire Co..	6	
Anchor Concrete Machy. Co.	72	
Babcock & Wilcox Co.Front Cover		
Bacon, Earle C., Inc....	100	
Barber-Greene Co....	93	98
Besser Mfg. Co....	62	
Bethlehem Steel Co....	16	
Birmingham Rail & Loco- motive Co.	103	
Blaw-Knox Co....	93	
Blue Ball Mach. Wks....	101	
Bradley Pulverizer Co....	97	
Brill Equipment Corp....	102	
Brooks Equipment & Mfg. Co.	88	
Bucyrus-Erie Co.		
.....Outside Back Cover		
Buell Engineering Co....	27	
Carlyle Rubber Co., Inc....	101	
Caterpillar Tractor Co....	3	
Chicago Perforating Co....	99	
Chicago Pneumatic Tool Co.	85	
Chicago Steel Foundry Co..	91	
Classified Advertising .101-105		
Cleveland Wire Cloth & Mfg. Co.	106	
Coast Metals, Inc....	87	
Columbus Steel Co....	6	
Combustion Engineering Co., Inc.	13	
Concrete Transport Mixer Co.	95	
Consolidated Products, Inc.101		
Davenport-Besler Corp.96		
Deister Concentrator Co....	97	
Dempster Bros. Inc.79		
Denver Equipment Co....	99	
Diamond Iron Works, Inc....	95	
Dixie Machinery Mfg. Co....	98	
Dorr Company, Inc.23		
Dunn, W. E., Co.	85	
Eagle Iron Works.....107		
Easton Car & Construction Co.	1	
Ensign-Bickford Co.108		
Equipment Corporation of America	102	
Fuller Co.	10	
Goodyear Tire & Rubber Co.	5	
Gruendler Crusher & Pulv. Co.	92	104
Gulf Refining Co.	12	
Hardinge Co., Inc....	92	
Harnischfeger Corp.	96	
Harrington & King Perf. Co.	94	
Hayward Co.	99	
Hendrick Mfg. Co....	96	
Highway Equipment Co....	71	
Jackson & Church Co....	70	
Jaeger-Lembo Mach. Corp.101		
Jaeger Machine Co....	67	
Jeffrey Mfg. Co....	90	
Jones, W. A., Foundry & Machine Co.	82	
Kent Machine Co....	72	
Keystone Driller Co....	59	
Kramer Products Co....	70	
Leschen, A., & Sons Rope Co.	91	
Lima Locomotive Works, Inc. (Shovel & Crane Div.)	88	
Link-Belt Co.	87	
Ludlow-Saylor Wire Co....	99	
McLanahan & Stone Corp.96		
McLeod, Alexander T....	103	
Manhattan Rubber Mfg....	99	
Marion Steam Shovel Co....	24	
Marmont-Herrington Co., Inc.	105	
Master Builders Co....	69	
Merrick Scale Mfg. Co....	97	
Mertes Machinery Co....	102	
Michael, J. B., & Co....	101	
National Concrete Masonry Assn.	83	
National Crushed Stone Assn.	20	
National Powder Co....	86	
National Ready Mixed Con- crete Assn.	20	
National Sand & Gravel Assn.	20	
National Wire Cloth Co., Inc.	90	
Nordberg Mfg. Co.	18	
Northwest Engineering Co. 17		
O'Neill, A. J....	104	
Osgood Co.	95	
Owen Bucket Co.	106	
Pennsylvania Crusher Co... 99		
Productive Equipment Corp. 94		
Raymond Pulverizer Div.... 13		
Robins Conveying Belt Co. 28		
Roebling's, John A., Sons Co.	89	
Ross Screen & Feeder Co. 97		
Ryerson, Jos. T., & Son, Inc.	99	
Sauerman Brothers	95	
Schaffer Poldometer Co.100		
Service Supply Corp....	103	
Simplicity Engineering Co. 84		
Sly, W. W., Mfg. Co....	21	
Smith, F. L., & Co....	4	
Smith Engineering WorksInside Front Cover		
Stearns Mfg. Co....	71	
Straub Mfg. Co....	93	
Stulz-Sickles Co....	96	
The Shovel Co....	11	
Thomaville Stone & Lime Co.	103	
Tidewater Equipment & Machy. Corp.	103	
Traylor Engineering & Mfg. Co.	7	
Tyler, W. S., Co....	98	
U. S. Steel Corp....	6	
Universal Crusher Co....	22	
Universal Vibrating Screen Co.	79	
Unverzagt, G. A....	102	
Vulcan Iron Works....	19	
Wall-Colmonoy Corp.	93	
Walsh, Richard P....	102	
Warner Co.	102	
Williley, A. R., & Sons, Inc. 99		
Williams Patent Crusher & Pulv. Co.	107	



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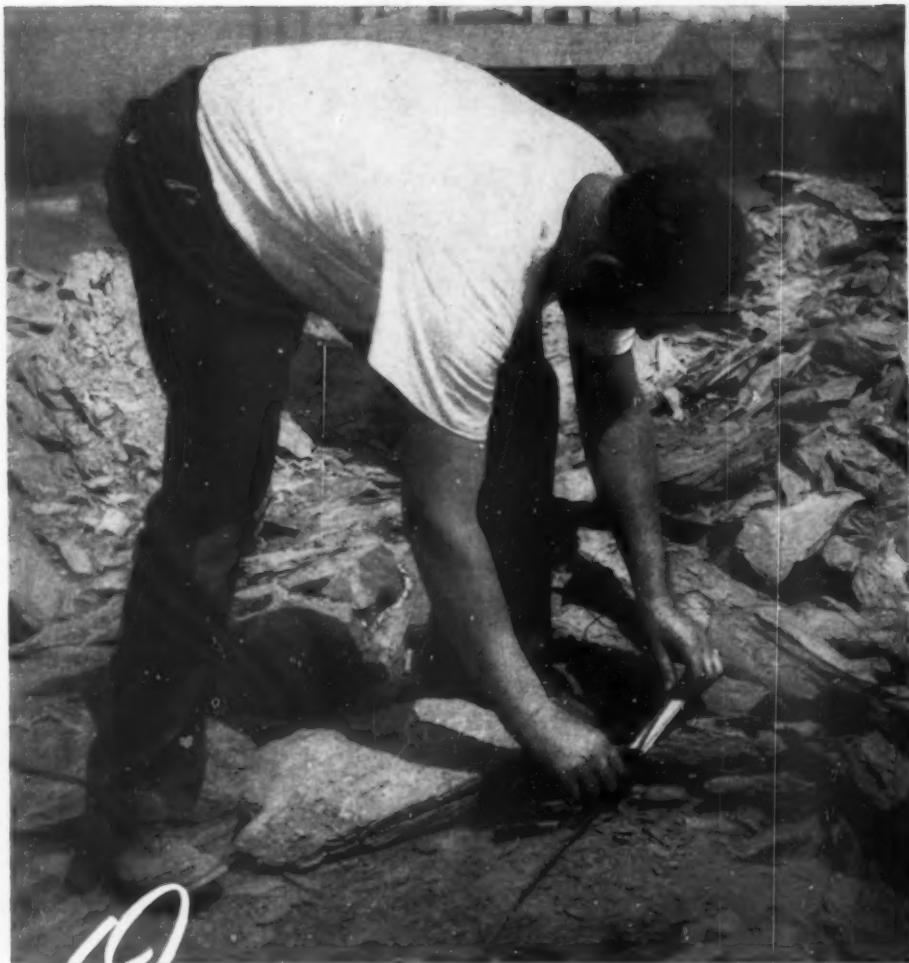
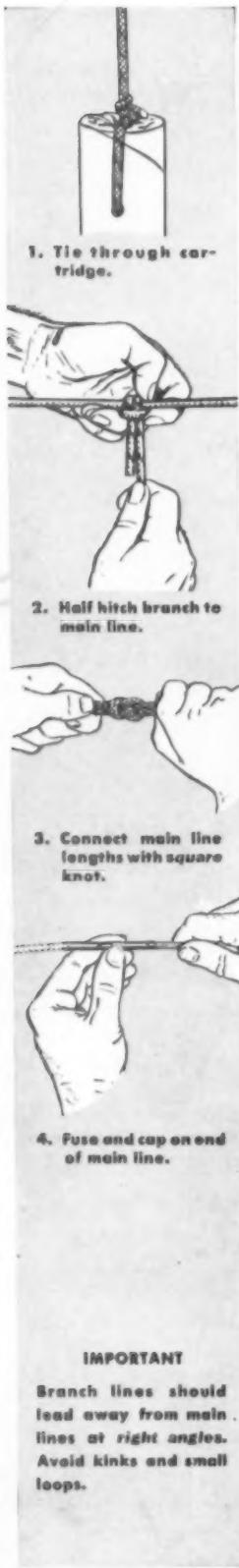
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Report of	Date
Name of	Date
Wire Construction	Date
Customer Name	Date
Report of	Date
Name of	Date
Wire Construction	Date
Customer Name	Date
Report of	Date
Name of	Date
Wire Construction	Date
Customer Name	Date

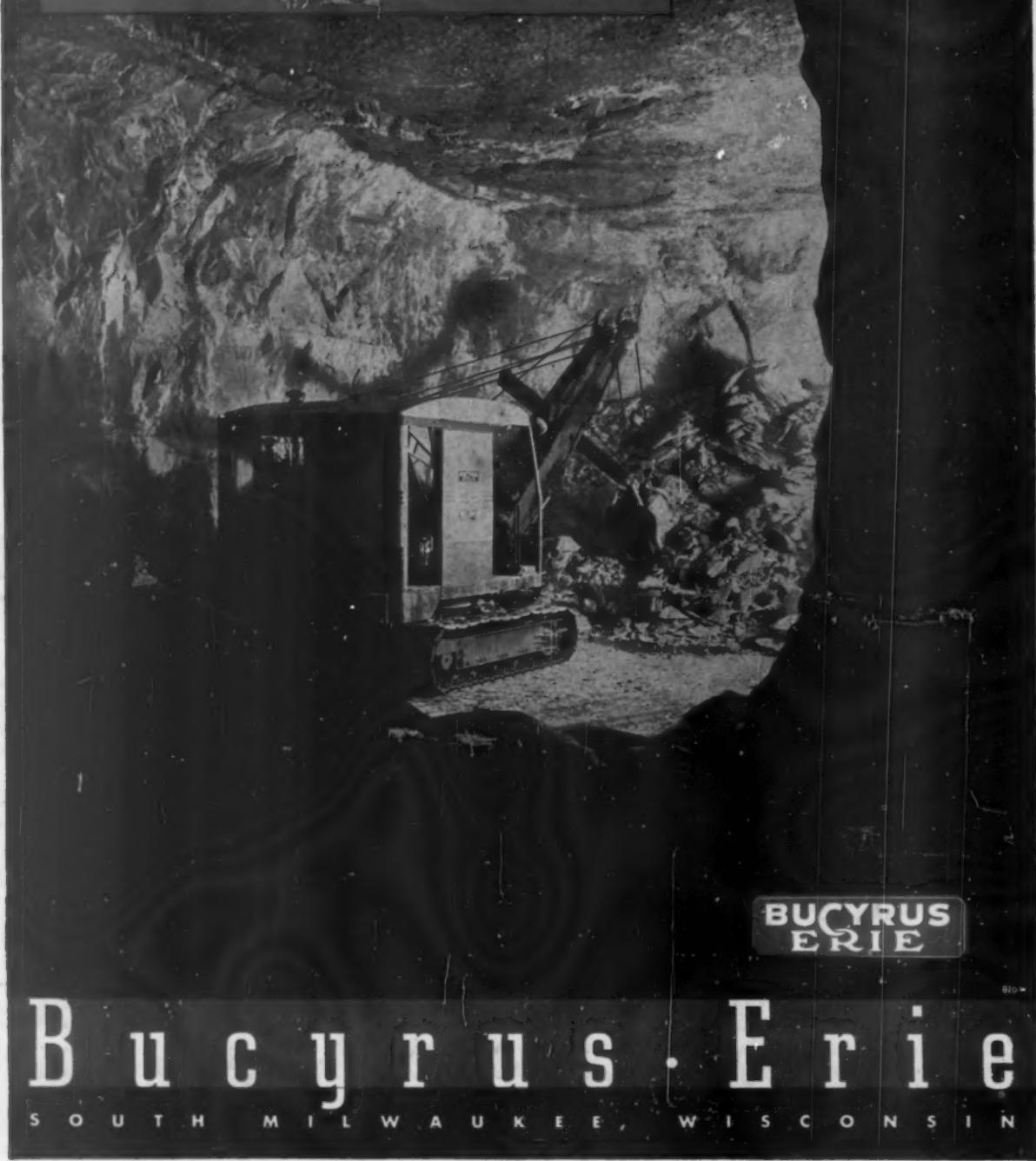
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